

**110-Inch Borescope Inspects Inaccessible Aircraft Structures**

A bore or rivetscope so long and thin that several big instrument laboratories said it could not be made is today carrying the examining eyes of inspectors at the Glenn L. Martin Co., Baltimore, Md., into what a few short weeks ago were considered completely inaccessible structures.

This new instrument, which is 110 in. long with only  $\frac{1}{4}$  in. outside diameter, was developed by Dr. George S. Crampton of the Lenox Instrument Co. in collaboration with engineers of the Martin inspection department to check blind rivets in a new type wing construction that would not admit most existing borescopes and could not be reached throughout its entire length by those which it would admit. Prior to the designing of the new instrument, it had been necessary with this type of construction to X-ray the entire wing and piece together in order to determine whether the individual rivets were properly set.

The new Martin rivetscope consists of a one-piece seamless steel outer tube and a seamless steel liner which spaces approximately 20 Achromat and simple lenses. A standard eyepiece is provided at one end together with a connection for a 6-volt transformer, while the other end carries a light and mirror similar to those in a conventional borescope.

This rivetscope is of extremely rigid construction with very little "whip", yet weighs only 10 lb. complete, and can be easily handled by women employees. In addition to the purpose for which it was designed, it is providing the answer to a wide variety of inspection problems ranging from inspection of an occasional defective rivet in PBM bomb bay fairings, to examination of long lengths of defective tubing.

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See pages 21-23 for Additional New Products

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Ordnance Award Presented



*Major General G. M. Barnes, chief of the research and development service, Office of the Chief of Ordnance, presents the Ordnance Distinguished Service Award to A.S.M. National President M. A. Grossmann and Secretary W. H. Eisenman on the occasion of the annual dinner of the Society held Oct. 19 at the Statler Hotel, Cleveland.*

Oregon Plans Four Lectures on Tools

Reported by H. H. Hewitt, Jr.  
Steel Tank and Pipe Co. of Oregon

Four lectures on tools and tool steels are planned for the educational program of the Oregon Chapter, *it was announced at the chapter meeting on Oct. 16.* "Tool Design" was discussed on Oct. 25; "Selection of Steel for Tool" is the subject for Nov. 29; "Tool Making Details Related to Heat Treatment" on Jan. 10, and "Heat Treatment of Tool Steels" on Feb. 7.

Principal speaker at the chapter meeting was A. Allan Bates of Westinghouse Electric & Mfg. Co. His talk on "Plastics Versus Metals" has been reported in previous issues.

**Agitation and Turbulence Provided in New Quenching Method for Uniform, Fast Cooling**

Reported by R. E. Christin  
Metallurgist, Columbus Bolt Works

"Agitation and turbulence that will produce a more uniform wiping and wetting action than by any other method of quenching, and, as a result, a faster cooling rate of the steel articles," was the theme of the illustrated talk on "Controlled Quenching and Tempering Affecting Hardenability," by Charles G. Purnell, vice-president, Tate Jones and Co., Inc., Leetsdale, Pa., at the September meeting of the Columbus Chapter.

"A study of existing methods," said the speaker, "indicated clearly that either direct impingement on localized spots or directional flow of the liquid was involved." Description of the new method to overcome uneven quenching was outlined in detail. The use of propellers and the study of liquid flow by the "propeller agitation" method indicated that, with proper location and sufficient horsepower and displacement, a type of agitation and turbulence could be developed which would produce a more uniform wiping and wetting action than by any other method of quenching.

**Schenectady Chapter Changes Name To Eastern New York Chapter**

The Schenectady Chapter of the American Society for Metals has voted to change its name to the Eastern New York Chapter, effective Dec. 12. Since 60% of the membership is now located outside of Schenectady, it was felt that the name should indicate the chapter's broader scope.

A ballot was sent to the members with 66 out of 95 votes registered in favor of the new name. The Executive Committee therefore voted the change early in September.

Proof was offered that by a substantial increase in the rate of turnover, a faster cooling rate of the steel articles could be produced (see Purnell Patent No. 2,322,777, granted in 1943). Purnell said that if a piece of steel is quenched and cooled in oil or water at the new cooling rates obtainable, the transformation of austenite to martensite actually takes place at a temperature somewhat lower than that indicated for a given steel on its respective S-curve, and showed micro-slides to prove his statement.

Further, he contended, when the steel, as quenched, is immediately placed in the tempering furnace, the transformation to the ultimate or final structure will take place at a rate faster than by any other method. Articles with varying cross-section or sharp corners, warp less and do not crack during the quenching or tempering operation.

Light quenching oils are recommended, preferably those having a viscosity of 100 to 110 at 100° F. Oil temperature must be controlled between 125 and 135° F.

With the use of the agitation and turbulence advocated by the speaker the so-called vapor phase of the quenching medium cannot persist on and around the article being quenched. In oil quenching practices, this feature alone presents economic value to the user in that the oil will not discolor, carbonize, burn, and sludge to the extent that these conditions occur by orthodox heat treating methods.

Structure obtained after tempering will depend on the residual heat after quenching and will determine the better machinability and greater toughness obtainable, without sacrifice of ductility but with increase in tensile strength.

(Continued on page 3)

**Epoch-Making Activities Characterize Largest Metal Congress**

The National Metal Congress and the National Metal Exposition were by all odds the most successful activities ever held under the direction of the A.S.M. Records were broken in every department and the events were received by the public as epoch-marking activities, judging from the tremendous amount of publicity which was generated and the general write-ups of the Congress and Exposition in national publications such as *Steel, Iron Age, Machinery, Business Week* and the daily press. Extracts from the published reports about the Congress and Exposition are printed in other columns of this edition of THE METALS REVIEW.

The housing of the thousands attending the Congress represented an almost superhuman task and was complicated by two important facts:

First, industry sent more representatives to the Metal Congress in Cleveland this year than in any previous year. In many instances companies accustomed to sending two men to the Congress sent as many as twelve this year, and consequently it was necessary to provide accommodations for many more than in any previous year.

Housing Campaign Necessary

The second complication was that the Cleveland hotels were unable to deliver the full number of rooms that had been promised when the city was selected. Some hotels failed by 40% to deliver the rooms they had promised. The hotels were not entirely responsible for this, because conditions had changed since their commitments were made and it was more difficult for them to clear their hotels of regular guests in order to provide accommodations for the five-day visitors to the Congress. Furthermore, two hotels which had usually allocated approximately 400 rooms to the Congress were taken over by the Government for the Waves.

In order to meet this unusual situation and to permit as many as possible to attend the Congress, an active and extensive campaign was promoted in Cleveland to secure accommodations for the visitors in private homes. In response to an appeal printed in the (Continued on page 2)

**McQuaid Gives Woodside Lecture at Detroit**

Reported by Eugene V. Ivanso  
Steel Sales Corp.

The second annual W. P. Woodside Lecture opened the 1944 season of the Detroit Chapter auspiciously on Oct. 9. Harry W. McQuaid, assistant chief metallurgist of Republic Steel Corp., was the lecturer. His talk on "Post-War Steel and Its Treatment" was published in full in the November issue of *Metal Progress*. At the conclusion of the lecture the speaker was presented with a scroll commemorating the occasion.

**PASS-A-ROUND**

Many executives in your plant will want to see this record of what happened last month in the metal industry. Just fill in the names, note items for special attention—and Pass-A-Round.

Name	Item No.	Check

**File or Clip for Future Reference**

This is a record of important new developments in the metal industry during the past month—Save it!

## Convention Housing Provided By Liner and Private Homes

(Continued from page 1)

daily press and headed "Lady can you spare a room?" hundreds of homes in Cleveland opened their doors and sent word to the Housing Bureau operated by the Cleveland Convention & Tourist Bureau that they would be glad to accept visitors to the Congress. In this way approximately 1500 rooms were provided and the large majority of these were in the best homes in Cleveland.

Even this situation did not offer sufficient accommodations, and about two weeks before opening of the Congress the Detroit and Cleveland Navigation Co. agreed to discontinue the Detroit-Buffalo run for their largest Great Lakes liner, the *Greater Detroit*, which they would tie up at the pier in Cleveland and operate as a hotel during the Congress, providing the Society would guarantee the entire cost and prospective receipts for the five days.

### Cost of Boat \$22,000

Dead-heading the boat from Buffalo to Cleveland and back to the home port at Detroit involved a charge of \$6000, together with a charge of \$3000 per day for the use of the staterooms, plus the cost of dockage, insurance and other items, making a total cost for the five days of \$22,000. A check for this amount was forwarded to the company and 600 staterooms



The liner *Greater Detroit* which served as a floating hotel providing 6000 beds for some of the visitors to the National Metal Congress in Cleveland.

were provided for visitors to the Congress. The rates established were \$3.00 per person for inside rooms and \$4.00 for outside rooms. The boat was about half occupied on Sunday, but filled to capacity on Monday, Tuesday and Wednesday nights, and again was about half filled on Thursday night, bringing in a total income of \$18,000, about \$4000 less than the total cost already paid. However, it was felt that this was money well expended, inasmuch as it provided 6000 additional beds for visitors.

Those who stayed on the boat had considerable fun, because everyone received a title of "Commodore" and no one had a commission less than that of lieutenant (j.g.). The boat operated dining-room service and soon acquired a reputation of serving the best and most reasonably priced meals in Cleveland during that week.

Frequently, however, it was observed on the purser's rate slip posted in each stateroom that the rate for the room was \$4.50 per night. This occasioned some surprise at the higher rates being charged until it was learned that those rates prevailed when the boat was traveling from one port to another and had approximately \$11 per person boat fare to help contribute to the cost of the crew and operation of the boat. During the five days that the boat was tied up at the dock in Cleveland this cost must be borne entirely by the amounts received as rental for the rooms.

An amusing event occurred one night when a gentleman came in, ate his dinner, secured his room and went to bed. Great was his surprise on arising to find the boat still tied to the Ninth Street pier when he expected to find himself in Detroit. Taking it all in all, those who lived on the boat had an experience which created widespread comment throughout the United States and was the subject of pictures and favorable comment in the national press.

### Colored Movie on Molding Sands Available

A four-reel movie entitled "The Behavior of Cores and Molding Sands at Elevated Temperatures" is available from the Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4, Mich. This 16-mm. colored motion picture film will be gladly loaned to technical groups, schools, and industrial concerns.



## Compliments

To DAYTON A. GURNEY, one of America's foremost heavy gun designers, on his completion of 39 years with the Ordnance Department. Mr. Gurney, a member of the Washington Chapter A.S.M., retired recently as chief ordnance engineer of the Artillery Division of the Ordnance Department, Army Service Forces.

To KARL M. KNAPP, Pittsburgh district sales manager for the Universal-Cyclops Steel Corp., on his appointment as chairman of the 1944 United War Fund drive in a district comprising seven western Pennsylvania counties.

To A. B. KINZEL, chief metallurgist of the Union Carbide and Carbon Research Laboratories, on his appointment as vice-president of Electro Metallurgical Co., New York.

To H. A. SCHWARTZ, manager of research, National Malleable and Steel Castings Co., Cleveland, on his selection to deliver the third American Foundrymen's Association foundation lecture, at the 1945 Foundry Congress next spring, on "Solidification of Cast Metals".

### New Haven Course Is on Composition

A special educational program entitled "Composition—How Does It Affect Metals?" is currently being sponsored by the New Haven Chapter A.S.M. at Hammond Laboratory, Yale University. The program consists of three lectures each on steels and on non-ferrous metals.

S. C. Spalding, metallurgical engineer, American Brass Co., is presenting the series on steels on Nov. 6, 13 and 20, while W. D. France, research metallurgist, Scovill Mfg. Co., will give the non-ferrous series on Nov. 27, Dec. 4 and Dec. 11.

### Light Metals Industry Foreseen for Puget Sound

Reported by H. P. Evans  
Metallurgist, Boeing Aircraft Co.

Puget Sound Chapter of the American Society for Metals opened the fall sessions with a lecture by Chris Gilson, vice-president of the Seattle Chamber of Commerce, on "Puget Sound Looks Forward". Mr. Gilson predicted that low electric power costs and the presence of aluminum and magnesium ores in particular should stimulate a complete light metals industry in the Northwest.

### What's NEW..... in THE METALS REVIEW

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## Research on Tinplate Gets First Publicity At Chicago Chapter

Reported by Elmer H. Snyder  
Chief Metallurgist, Austin-Western Co.

Moving pictures of what you can see through the microscope on the surface of electrodeposited tinplate when the tin is fused were presented publicly for the first time at the Oct. 12th meeting of the Chicago Chapter A.S.M.

Speaking on "Advances in the Manufacture of Tinplate," Edwin D. Martin, assistant chief metallurgist in charge of development and research for the Inland Steel Co., described research projects in the Inland laboratories and also sponsored at Armour Research Foundation, covering the phenomena involved in melting the as-deposited matte tin on the surface of the steel. Although Inland pioneered the application of induction heating to this job of melting the tin, this company has progressed to a more advanced method involving the use of gas radiant burners in a unit under automatic control to a pre-selected temperature over the melting point of tin.

The phenomena of polarization of the anodes in the sodium stannite bath and the part this plays in plating efficiency and in coating weight control formed another research project described for the first time.

### 1945 Metal Congress

ANNOUNCEMENT of the location of the 1945 National Metal Congress and Exposition was not made this year as is customary at the annual meeting of the American Society for Metals on Oct. 18. Negotiations are now actively under way with several large cities, and announcement of the location selected will be made as soon as arrangements can be completed.

The voltage-amperage relationships, character of film developed on the surface of anodes and the part they play in both cathodic and anodic efficiencies, were outlined. Control of the state of bath oxidation to a constant sodium stannite concentration by bath composition and electrical control of the anode polarization were illustrated and described in detail. The common ion effect on OH ion concentration was elucidated and the results of studies of its effect on best bath composition were given.

Oil must be applied to the surface of electrolytic tinplate to help prevent oxidation, to facilitate feeding of plates from stacks and to act as a lubricant in dies, but the quantity which can be incorporated in protective lacquers applied later is very small. The problem of applying 4 drops of oil in a uniform film covering 435 sq. ft. of surface and methods developed to solve this problem were discussed. On steel 0.0104 in. thick, 0.00003 in. of tin is applied, as an example of electrolytic tinplate, and on this an oil film 0.0000002 in. thick is superimposed.

Dr. Martin expressed the opinion that electrolytic tinplating is here to stay and will not be replaced by old hot dipping methods after the war.

### Southern Tier Resumes Regular Meetings

Reported by James S. Meyer  
Metallurgist, International Business Machines Corp.

After a lapse of about two years, necessitated by transportation restrictions, the Southern Tier Chapter resumed active status again with regularly scheduled meetings in September and October. The October meeting was held in Oswego, N. Y., on the 23rd. A large audience was present to hear an instructive program on "Tool and Die Steels", presented by L. C. Grimshaw and R. P. Kells of the Latrobe Electric Steel Co., which has been reviewed when presented before other chapters.

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### Schemm Joins Ajax, Goes to San Francisco

C. W. Schemm has joined the Ajax Electric Co., Philadelphia, as sales engineer in northern California with headquarters in San Francisco. For a number of years he was industrial heating specialist of the General Electric Co. in the St. Louis area and is past chairman of the St. Louis Chapter of American Society for Metals.

## Cincinnati Visits Wright Engine Plant



### Hardenability Band Formation Demonstrated for NE 8740

Reported by A. H. Rauch  
Metallurgist, Deere & Co.

"The Development and Possibilities of Hardenability Bands" was the subject of the address delivered by John Mitchell, Carnegie-Illinois Steel Corp., before the Tri-City Chapter on Oct. 10.

Mr. Mitchell pointed out the advantages of hardenability bands to the consumer in securing less variation in response to heat treatment. Advantages accrue also to both producer and consumer in that fewer heats falling outside the specified chemical composition ranges would have to be submitted for approval and a smaller number of heats would be rejected for "off" chemical composition.

The formulation of hardenability bands was illustrated by the establishment of the tentative hardenability band for NE 8740 steel. Of two months' production of 112 heats, 19 heats or 16.9% were found to be outside of the specified composition limits. However, on plotting the frequency curves of the D<sub>1</sub> values, it was found that 16 of these heats showed ideal D<sub>1</sub> values but that four of the acceptable heats showed poor D<sub>1</sub> values. Hardenability bands were established on the basis of calculated end-quench curves representing the middle third of the present composition range, supplemented and adjusted in accordance with actual test results.

Mr. Mitchell pointed out that hardenability may vary with the plant practice of the producer and he advocated allowing the producer to modify the chemical composition to meet hardenability requirements.

### New Immersion Process Protects Exterior of Cans

Reported by John B. Segada  
Metallurgist, Youngstown Sheet & Tube Co.

Bruce W. Gonser, metallurgical supervisor, Non-Ferrous Division of Battelle Memorial Institute, brilliantly reviewed "Recent Advances in Non-Ferrous Metallurgy" before the Calumet Chapter on Oct. 10. He told of the part the chemical engineers and electrochemists are playing in the development of processes for the recovery of "rare" elements and their subsequent application on a production scale. Of particular interest were the metallurgy, properties, and future possibilities of such metals as titanium, zirconium, tantalum, columbium, molybdenum, and silicon.

Dr. Gonser described the problem that confronted canneries in protecting tinned cans for shipment to armed services where severe loss by external corrosion occurred. Use of the thinner electrolytic tinplate made the problem more acute. Aside from the means now used of lacquer coating the filled can, a process has been developed and is now much used in England whereby simple immersion of the filled and sealed can in a hot oxidizing detergent solution has completely inhibited or definitely retarded atmospheric corrosion. This simple treatment makes thinly coated electrolytic tinplate superior to untreated hot dipped tinplate as far as external rusting of cans is concerned.

New processes for siliconizing, chromizing, tinning, and aluminum coating steel were mentioned. In one procedure for aluminum coating steel, the base strip is first oxidized slightly or blued, then sent through a controlled reducing atmosphere to produce a reactive, newly reduced iron surface before immersion in molten aluminum.

*Show above is the group of Cincinnati Chapter members that visited the Wright Aeronautical Corp.'s huge engine plant in Lockland, Ohio, on Oct. 5. Starting at 2:00 p.m., the program included visits to the aluminum and magnesium foundries, the machine shop, engine assembly and test cells; a motion picture "Wright Builds for Air Supremacy"; a cafeteria supper and evening lecture on "Fabrication of Magnesium Alloys" by A. W. Winston, research metallurgist, Dow Chemical Co., followed by the motion picture "Working in Magnesium".*

### Construction of Open-Hearth And Electric Furnaces Detailed

Reported by F. C. Lehman  
Joslyn Mfg. and Supply Co.

A concise idea of the construction of both open-hearth and electric furnaces was provided by slides and detailed explanations when L. H. Nelson, mill metallurgist, Republic Steel Corp., Chicago plant, addressed the Fort Wayne Chapter of A.S.M. on Sept. 26. The regenerative system of checker work, necessary to attain the high temperature required to melt a heat of steel, was shown in detail, while other slides illustrated the construction of a 70-ton basic electric furnace.

Projected graphs and curves showing the various stages of chemical composition in a molten bath of steel were discussed in detail during the making of a heat of S.A.E. 4340 steel. Chief advantages of electric furnace operation over open-hearth are:

1. Greater and more accurate slag and temperature control during the making of the heat.
2. A much better source of heat which introduces no impurities to the bath.
3. High percentage of recovery of alloy additions to bath.
4. Uniformity of quality, both chemically and physically, from heat to heat.

### Grimshaw and Kells Address Lehigh

Reported by R. L. Deily  
Bethlehem Steel Co.

The analyses, properties and effects of alloying elements on tools and die steels were ably discussed by L. C. Grimshaw, chief metallurgist of Latrobe Electric Steel Co., at Lehigh Valley Chapter's first meeting on Oct. 6. Acting as commentator on his talk was R. P. Kells, chief service engineer for Latrobe. Messrs. Grimshaw and Kells' discussion has been reported in previous issues.

### Fast, Uniform Quenching Described

(Continued from page 1)

Installations have been made in over 80 plants, involving articles ranging from very small parts for precision instruments up to 4.7-in. guns, 27 ft. long. Armor plate 35 ft. by 66 in. by 2 in. thick, 75-mm. to 8-in. shells, 30-caliber carbine barrels, cutting pliers, wrenches, and lock washers are other applications.

To prove that isothermal heat treating is now 204 years old, Mr. Purnell quoted history when he mentioned that "In 1740, Christian Polhem, a Swede, gives a number of hardening wrinkles which still are of value, and for thin knives and shears he recommended quenching in molten lead."

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## A.S.M. Research Medal Presented to R.C. Stanley of International Nickel

Robert Crooks Stanley, chairman and president of the International Nickel Company of Canada, Ltd., received the A.S.M. Medal for the Advancement of Research during the annual dinner of the American Society for Metals on Oct. 19 at Cleveland. The award is made annually to the executive who has consistently sponsored metallurgical developments and by his foresight has helped to advance the arts and sciences relating to metals.

In presenting the medal to Mr. Stanley, Zay Jeffries, a past president of the A.S.M. read the following citation:

Robert Crooks Stanley early recognized the importance of research to the mining and metallurgical industries. Upon becoming president of the International Nickel Co. in 1922, one of his first official acts was the creation of a new development and research department, thereby establishing research as a primary activity of the company. Up until that time nickel still was regarded as a "war metal", useful almost solely for the production of guns, armor plate and projectiles. Through Mr. Stanley's strong support and consistent maintenance of research, nickel has been developed into an industrial metal with widely diversified engineering applications.

As an illustration, the early varieties of copper-nickel alloys which were characterized as corrosion resisting metals having the strength of rolled structural steel have been supplemented by new alloys with much higher strengths comparable to hardened alloy steels. Today these alloys form the basis of the products of the rolled nickel industry.

The development of nickel alloyed cast irons not only created an entirely new group of alloyed metallurgical products, but served as well to enlarge the whole horizon for that basic metallurgical material known as cast iron.

To these and other examples of broad significance resulting from research supported internationally by Robert Crooks Stanley must be added numerous developments which individually have been of smaller scope. But in total they have provided the information and experience from which nickel has become one of the foremost of the alloys for improving the engineering properties of other metals.

This work not only has served well the company which undertook it, but its well-recognized results represent a pioneering and practical demonstration to the mining and metallurgical industries of the value and importance of organized corporate research.

As announced in the September issue of THE METALS REVIEW, the Albert Sauveur Achievement Award was presented to Walter Jominy at the A.S.M. annual dinner; the Henry Marion Howe Medal for the best paper in Transactions to R. A. Flinn, Earmshaw Cook and J. A. Fellows; and the Past President's Medal to Herbert J. French. The main address at the dinner was presented by Major George Fielding Eliot on "Fruits of Victory."

The annual meeting of the American Society for Metals was held on Wednesday morning, Oct. 18. The complete reports of the national officers presented at that meeting will be published in the annual volume of Transactions to appear shortly after the first of the year. (See order form on page 18.)

### Gill Describes Heat Treatment Of Commercial High Speed Steels

Reported by Charles L. Willets

Heat Treater, Solvay Process Co.

A clear and concise description of the methods of heat treating each commercial type of high speed steel was afforded by a lecture delivered before the Syracuse Chapter A.S.M. on Oct. 3 by James P. Gill, vice-president of Vanadium-Alloys Steel Co.

Mr. Gill's classification included the tungsten, molybdenum, chromium and cobalt steels; he paid high tribute to the 18-4-1 type which, in his opinion, gives the best all-around results.

Mr. Gill concluded his talk with a description of laboratory experiments on the cold treatment of metals. While the process has been found to increase greatly the life of some tools, laboratory tests have not given consistent results and little is yet known about the actual change that takes place in the metal.

# A.S.M. REVIEW OF CURRENT METAL LITERATURE

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad,  
Received in the Library of Battelle Memorial Institute, Columbus, Ohio, During the Past Month

## 1. PRODUCTION OF METALS

1-125. Lithium. A. G. Arend. *Industrial Chemist*, v. 20, August '44, pp. 423-426.

Extraction, recovery, and industrial uses.

1-126. Boron in Steel. R. W. Gurry. *Iron & Steel*, v. 17, Sept. '44, pp. 601-602, 612.

Relative deoxidizing power and elimination in the open-hearth process.

1-127. Swedish Sponge Iron. Einer Ameen. *Iron & Steel*, v. 17, Sept. '44, pp. 608-612.

Theory, practice and economics of a direct reduction process.

1-128. How to Melt Bronze. A. E. Cartwright. *Foundry*, v. 72, Oct. '44, pp. 85, 216, 218, 220.

Equipment for melting and precautions to observe in practice.

1-129. Manganese Metal Ready for Large-Scale Production. James H. Jacobs, John Hunter, and Warren Yarrell. *Engineering & Mining Journal*, v. 145, Oct. '44, pp. 88-91.

Ore reduction; leach conditions; the electrolysis; cell construction; cathode cleaning.

1-130. First Report on the Basic Cupola by the Melting Furnaces Sub-Committee. *Foundry Trade Journal*, v. 74, Sept. 21, '44, pp. 55-59.

Basic brick linings; cupola melting of ferro-manganese; desulphurization; experiments in dephosphorization; preliminary melts with pig-iron; dephosphorization of steel scrap, wrought iron and pig-iron charges.

1-131. Magnesium From Sea Water. Gerald E. Stedman. *Metals and Alloys*, v. 20, Oct. '44, pp. 941-948.

Engineering, metallurgical and chemical aspects of the process and a description of the Dow-operated Velasco, Texas, plant for carrying it out.

1-132. Rimming Steel—Experiments on Melts of Rimming-Steel Composition in the Laboratory High-Frequency Furnace. T. Swinden, W. W. Stevenson, and G. E. Speight. *Engineers' Digest*, v. 1, Sept. '44, pp. 585-586.

The prime difficulty in reproducing ideal rimming conditions in these small ingots by the technique described was the prevention of the rapid growth of the crust of pure metal.

1-133. Recent Progress in Tin Smelting and Metallurgy. C. L. Mantell. American Institute of Mining & Metallurgical Engineers Preprint, Oct. '44, 18 pp.

Ores; tin deposits; smelting; metallurgy; stages in smelting; tin smelters. 10 ref.

1-134. Antimony—Its Metallurgy and Refining in Recent Years. Chung Yu Wang and Guy C. Riddell. American Institute of Mining & Metallurgical Engineers Preprint, Oct. '44, 16 pp.

Liquation of crude antimony; volatilization roasting for preparation of volatile trioxide; the pigmental trioxide; production of metallic antimony; by-products of antimony smelting; extraction by wet methods; refining of antimony metal; production economies. 14 ref.

1-135. Modern Plants for Reduction of Quicksilver. Gordon I. Gould. American Institute of Mining & Metallurgical Engineers Preprint, Oct. '44, 16 pp.

Rotary furnaces; feeding rotary furnaces; firing rotary furnaces; multiple-hearth furnaces; dust-collecting equipment; exhaust fans; condensing systems; settling tanks and stack; control; retorts; concentration before roasting; health hazards; typical installations. 3 ref.

1-136. Beryllium. Donald M. Liddell. American Institute of Mining & Metallurgical Engineers Preprint, Oct. '44, 5 pp.

Early metallurgy; electric furnace processes; reduction to metal; commercial processes; Perosa process.

## 2. PROPERTIES OF METALS

2-38. Damping Capacity of Metals. W. H. Hatfield, L. Rotherham, and E. M. A. Harvey. *Iron & Steel*, v. 17, Sept. '44, pp. 613-618.

The effect of air resistance, length of service, temperature changes, reproducibility of tests, variation in alloy contents and mechanical treatment.

2-39. Aluminum for Beginners. *Light Metals*, v. 7, Sept. '44, pp. 459-460.

Elementary history and field of application of aluminum.

2-40. Phosphorus in the Metal Industries. Frank T. Sisco. *Mining & Metallurgy*, v. 25, Oct. '44, p. 491.

The principal evil of phosphorus is that it causes cold-shortness (brittleness at atmospheric temperature or below) in steels or low-carbon irons made from pig or cast iron containing a considerable percentage of the element.

2-41. Silver, Lead and Indium. Urban A. Mullin. *Monthly Review*, v. 31, Oct. '44, pp. 898, 900-903.

Silver, lead and indium make a combination which, to date, has not been excelled for bearings subjected to high speeds and heavy loads.

## 3. PROPERTIES OF ALLOYS

3-176. The Removal of Gases from Molten Bronzes. W. A. Baker and F. C. Child. *Institute of Metals Journal*, v. 70, August '44, pp. 349-371.

Tin bronzes are subject to gas unsoundness arising in particular from solution and evolution of hydrogen, and to a lesser extent from water vapor, carbon monoxide, and sulphur dioxide. In the absence of elements with a high affinity for oxygen, which form comparatively insoluble oxides, hydrogen may be eliminated by oxidation of the melt, followed by deoxidation to remove the excess of oxygen added. Commercial bronzes such as are used for sand castings generally contain considerable amounts of phosphorus and/or zinc which hinder the removal of hydrogen by oxidation. Hydrogen can be readily removed by scavenging treatments with inert gases and/or by the addition to the charge of substances which evolve inert gases during melting. 2 ref.

3-177. The Effect of Shrinkage and Gas Porosity on the Pressure Tightness and Mechanical Properties of Bronze Sand Castings. W. A. Baker, F. C. Child, and W. H. Glaisher. *Institute of Metals Journal*, v. 70, August '44, pp. 373-406.

Tin-bronze castings are liable to contain small interdendritic and intercrystalline cavities which cause leakage under pressure and mechanical weakness. The cavities are primarily due to freezing shrinkage, which is not easily fed owing to the long freezing ranges of the alloys. Practical recommendations. Importance of selecting the correct alloy for the purpose required, and particularly the value of leaded leaded metals for intricate castings required to be pressure tight, is stressed. 2 ref.

3-178. The Influence of Melting Conditions on the Physical Properties of Steel Castings. H. T. Protheroe. *Iron and Steel Institute Advance Copy*, August '44, 23 pp.

Report on the mechanical test results obtained from a number of cast steels from various sources. Critical examination of the data recorded during manufacture and used in conjunction with mechanical test results in an attempt to trace the factors having the most pronounced influence on the quality of cast steel. Combined phosphorus and sulphur percentage affects the mechanical properties to a much greater extent than do other factors. Unsoundness also has a pronounced effect. Casting temperature, under controlled conditions, may have a slight effect. Microstructure of the cast steels does not differ appreciably.

3-179. Future Steels. W. P. Eddy. *Iron & Steel*, v. 17, August '44, pp. 566-569.

Effect of wartime developments on specifications and uses.

3-180. The Torsional Impact Strength of Tool Steels. R. Scherer and H. Kessler. *Stahl und Eisen*, v. 63, '43, pp. 353-357. *Alloy Metals Review*, v. 3, March '44, p. 1.

Studies of the effect of tempering on the toughness and torsional impact strength at temperatures up to 350° for carbon and carbon-chromium steels and up to 650° for high speed steels show that performance depends upon hardness, linear expansion and magnetic properties. Optimum heat treatments are given.

3-181. The Developments of Substitute Heat-Resisting Cast Steels for Low Temperature Service. R. Schinner and R. V. Tinti. *Stahl und Eisen*, v. 63, '43, pp. 125-133, 151-153. *Alloy Metals Review*, v. 3, March '44, p. 1.

Complete mechanical properties at room and elevated temperatures resulting from different heat treatments, hot brittleness and weldability of plain and alloyed cast steels, containing C 0.1 to 0.42, Si 0.2 to 1.4, Mn 0.3 to 1.9, Cr 0 to 2, Mo 0 to 0.63 and V 0 to 0.48% were determined. High Cr and Cr-Mn steels were hot-brittle. Cr-V steels containing more than 0.28% C tended to develop cracks on welding. Welded areas had poorer mechanical properties than the parent metal. The effect of alloying elements, and additions of Ti and Cr, on heat treatment and properties is discussed.

3-182. Making and Study of a Special Ni-Mn-Mo Electric Cast Steel. Jean Cournot. *Rev. Metal.*, v. 39, '42, pp. 61-64. *Alloy Metals Review*, v. 3, March '44, p. 1.

Melting log, casting practice and mechanical properties of the finished steel containing C 0.28 to 0.33, Ni 1.8 to 2.1, Mn 1.0 to 1.2, Mo 0.15 to 0.35 and Si 0.25 to 0.40% are given. After quenching from 875° in oil or normalizing from 875°, both followed by 1 hr. drawing at 600°, quenched steel has 115,000 tensile strength, 85,000 yield point, and 13% elongation; normalized steel has 100,000 tensile strength, 78,000 yield point and 18% elongation in 2 in.

3-183. The Effect of Carbide-Forming Elements on the Elastic Limit of Steel at Room Temperature. K. Dies. *Archiv für Eisenhüttenwesen*, v. 16, '43, pp. 333-340. *Alloy Metals Review*, v. 3, March '44, p. 2.

The effects of Ti, V, Cr and Mo on the elastic limit of steel samples in various stages of heat treatment were investigated. After cooling in the furnace from 930°, the elastic limit disappears with the complete binding of carbon to carbide. The transition from the one type of flow limit to the other takes place gradually in Cr and Mo steels and abruptly in Ti and V steels. After cooling in air, conditions in titanium steels are similar to those after furnace cooling, but the vanadium steel still shows after complete binding of the carbon an unstable flow curve in a certain alloying range; from this it can be concluded that vanadium carbide, like iron carbide, can produce a pronounced flow limit. Tempering experiments show that for the elastic limit, the chemical nature of the carbides is less of a determining factor than their distribution.

3-184. The Effect of Small Additions on the Crystallization and Physical Properties of Some Special Alloys. V. S. Mes'kin and Yu M. Margolin. *Stal*. no. 5, '41, pp. 47-53. *Chem. Zentr. no. 2*, '42, p. 1284. *Alloy Metals Review*, v. 3, March '44, p. 2.

In heat resisting Cr-Al alloys having high electrical resistance, small additions of vanadium and fireclay retard grain growth at high operating temperatures. Small additions of Ti, Ta and V to 14% Cr stainless steel increase resistance to corrosion by sea water and boiling HNO<sub>3</sub> solutions and also improve the mechanical properties. Small additions of Ti and V to Permaloy affect primary crystallization and the magnetic properties, the initial permeability being more than double while the coercive force is decreased one-third.

3-185. Specifications for Lead, Tin and Zinc Alloys. *Metallurgia*, v. 30, August '44, pp. 184-186.

With the object of rationalizing the whole field of non-ferrous metals and alloys, Services Schedule B.S./S.T.A. 7 was prepared. In view of its magnitude, copper and its alloys were dealt with in 1942, an additional section covering nickel and its alloys in 1943, while the present review concerns three further sections which have been added covering specifications for lead, tin and zinc and their alloys.

3-186. The American National Emergency Steels. Roger F. Mather. *Metallurgia*, v. 30, August '44, pp. 197-201.

Detailed account of the development of the American National Emergency steels and includes the recent revised list of NE steel compositions. Various aspects of the subject are discussed covering raw materials, steel-making and application.

3-187. Nickel Bronze Castings. Ely Portman. *Metals & Alloys*, v. 20, Sept. '44, pp. 620-624.

Production practice for relatively hard-to-handle nickel bronze castings that permits their economical production, with properties well within specification limits. 2 ref.

3-188. Strong Cast Aluminum Alloy, Requiring no Heat Treatment. Albert J. Matter. *Metals & Alloys*, v. 20, Sept. '44, pp. 643-644.

The engineering properties and some service test results of "OH38" aluminum alloy.

3-189. Fundamental Principles Involved in Segregation in Alloy Castings. R. M. Brick. *Metals Technology*, v. 11, Sept. '44, pp. 3-12.

Coring; gravity segregation; normal and inverse segregation. 10 ref.

3-190. A Review of Factors Underlying Segregation in Steel Ingots. B. M. Larsen. *Metals Technology*, v. 11, Sept. '44, pp. 13-34.

Undercooling and nuclei formation; temperature gradients and heat dissipation during freezing; directional growth of crystals; selective freezing and diffusion; dendrite formation; grain size, orientation in outer ingot zones; settling of free-floating dendrites—volume change in freezing; effects of liquid motion and stirring caused by gas evolution; freezing of typical rimmed ingot; transition series of ingot structures with decreasing gas evolution; hydrogen evolution during solidification; segregation of oxygen and non-metallics. 4 ref.

3-191. The Relation of Open-Hearth Practice to Segregation in Rimmed Steel. J. W. Halley and G. L. Plimpton. *Metals Technology*, v. 11, Sept. '44, pp. 37-57.

Mechanisms producing segregation; effect of practice on segregation; temperature and mold practice; examples of segregation in rimmed ingots. 11 ref.

3-192. Segregation in a Large Alloy-Steel Ingots. S. W. Poole and J. A. Rosa. *Metals Technology*, v. 11, Sept. '44, pp. 58-72.

Determining the distribution of chemical elements within a large, killed alloy steel ingot, by sulphur printing and quantitative chemical analysis. 4 ref.

3-193. Segregation in Babbitt. T. E. Eagan and W. R. McCrackin. *Metals Technology*, v. 11, Sept. '44, pp. 73-88.

Experimental procedure; casting of babbitt; effect of cooling rate; effect of stirring babbitt during freezing; addition of small amounts of metal; segregation in crystal size and orientation control in centrifugally cast bearings.

3-194. Inconel, Wrought and Cast, Materials Work Sheet. *Machine Design*, v. 16, Oct. '44, pp. 113-116.

Properties; physical constants; characteristics; applications; fabrication; corrosion resistance; galvanic corrosion; annealing.

3-195. Effects of Precipitation Treatment of Magnesium-Aluminum Alloys. F. A. Fox and E. Lardner. *Engineering*, v. 158, Sept. 15, '44, pp. 218-220.

The metallurgy of the precipitate; ascertaining whether any one particular form is to be desired or is to be avoided from the point of view of its influence on the mechanical properties of a typical commercial alloy.

3-196. The Physical Properties of High Carbon Steel Rope Wire as Affected by Variations in Patenting. H. J. Godfrey. *Wire & Wire Products*, v. 19, Oct. '44, pp. 635-642.

Nature and deviation of the physical properties of cold drawn wire due to variations in the heat treatment of the patented wire.

3-197. Permanent Magnets. Werner Jellinghaus. *Iron & Steel*, v. 17, Sept. '44, pp. 597-600.

Quaternary alloys of Fe, Ni, Al, Co and Cu with preferred magnetic orientation.

3-198. Effects of Precipitation Treatment of Magnesium-Aluminum Alloys. F. A. Fox and E. Lardner. *Engineering*, v. 158, Sept. 22, '44, pp. 238-240.

The precipitation of beta phase from the supersaturated solution of aluminum in magnesium; mechanical properties.

3-199. 755—Alcoa's New High Strength Aluminum Alloy. J. A. Nock. *Metals and Alloys*, v. 20, Oct. '44, pp. 922-925.

The complete engineering story of the nature, properties, workability and applications.

3-200. R 301—Reynolds' New High Strength Aluminum Alloy. T. L. Fritzler and L. F. Mondolfo. *Metals and Alloys*, v. 20, Oct. '44, pp. 926-933.

Its general attributes are those of a high strength, light weight material with corrosion resistance comparable to that of pure aluminum but with mechanical properties superior to those of conventional pure-aluminum-clad metals. It is also easy to fabricate, can be heat treated, and introduces no contamination in the usual scrap-handling systems.

3-201. The Magnetization of Polycrystalline Iron and Iron-Silicon Alloys. G. C. Richer. *Iron & Steel Institute*, Advance Copy, Sept. '44, 50 pp.

New survey of the competency of the domain theory. Conclusion is that the basic theory can provide reliable guidance for industrial effort but inherently significant disharmonies between theory and observation are common to laboratory single crystals and to commercial polycrystalline aggregates. New method of analysis of the technical magnetization curve. 35 ref.

3-202. Distribution of Carbon Between Titanium and Iron in Steels. W. P. Fishel and Brison Robertson. American Institute of Mining and Metallurgical Engineers Technical Publication no. 1763, 4 pp.

Distribution of carbon between titanium and iron has been studied by measuring the relative amounts of iron carbide and titanium carbide present in a series of annealed steels in which the ratio of titanium to carbon extended from 0.527 to 4.61. 5 ref.

3-203. Recovery of Cold-worked Aluminum Iron as Detected by Changes in Magnetic Properties. J. K. Stanley. American Institute of Mining and Metallurgical Engineers Technical Publication no. 1767, 10 pp.

How strains are relieved in aluminum iron at low temperatures. How cold working and strain relief might shed some light on what takes place in the deformation of metals. 19 ref.

**3-204. The Hardness of Silver-Antimony Solid Solutions.** R. M. Treco and J. H. Frye. American Institute of Mining & Metallurgical Engineers Technical Publication no. 1769, 6 pp.

Relation between hardness and concentration in the system silver-antimony determined over the range from very dilute to nearly saturated solutions of antimony in silver. Effect of cadmium in silver is somewhat similar but the slope of the curve increases much less rapidly with concentration. 8 ref.

**3-205. Substitute Solders of the 15-85 Tin-Lead Type.** J. B. Russell and J. O. Mack. American Institute of Mining & Metallurgical Engineers Technical Publication no. 1770, 16 pp.

Development of an alloy containing a maximum of 15% tin, with no cadmium or bismuth, having solder properties equivalent to or better than those of substitute solders now specified containing 18 to 20% tin, or even approaching the properties of the standard 40 to 60 tin-lead solder. 25 ref.

**3-206. Grain Size and Properties of Sand-cast Magnesium Alloys.** R. S. Bush and C. W. Phillips. American Institute of Mining & Metallurgical Engineers Technical Publication no. 1771, 11 pp.

Data giving the relationship between grain size and mechanical properties. Data also included on the combined effects of grain size and microporosity. Discussion of factors influencing the grain size of sand castings included. 9 ref.

**3-207. Creep Data on Die-Cast Zinc Alloy.** E. H. Kelton and B. D. Grissinger. American Institute of Mining & Metallurgical Engineers Technical Publication no. 1774, 6 pp.

Final data on well-known zinc die-casting alloys and means of applying these data to engineering design. 2 ref.

**3-208. Creep Properties of Cold-Drawn Annealed Monel and Inconel.** B. B. Betty, H. L. Eiselsstein and F. P. Huston. American Institute of Mining & Metallurgical Engineers Technical Publication no. 1775, 12 pp.

Accumulated data on two solid solution alloys, cold-drawn, annealed Monel and cold-drawn, annealed Inconel. 5 ref.

**3-209. Creep Characteristics of a Phosphorized Copper.** H. L. Burghoff and A. I. Blank. American Institute of Mining & Metallurgical Engineers Technical Publication no. 1777, 19 pp.

Creep characteristics of a deoxidized copper of low residual phosphorus content. 10 ref.

**3-210. The Effects of Notches of Varying Depth on the Strength of Heat Treated Low Alloy Steels.** George Sachs, J. D. Lubahn and L. J. Ebert. American Society for Metals 1944 Preprint no. 15, 25 pp.

The combined effects of notch depth and notch radius on the tensile strength of a low alloy steel, heat treated to various strength levels between 145,000 and 240,000 psi, were found to be considerably different from previously observed effects. The effect of notch depth on the notch strength ratio can be represented by a single family of curves, the same curve applying to a sharply notched steel of rather low strength and to a high strength steel, provided with a well-rounded-off notch. 11 ref.

#### 4. STRUCTURE

**4-39. The Metallographic Examination of Aluminum Alloys.** N. H. Mason, G. J. Metcalfe, and B. W. Mott. *Metallurgy*, v. 30, August '44, pp. 212-214.

Type of microscope, method of illumination of specimens, and methods of mounting and polishing specimens of alloys of different types. Some microstructural characteristics of cast and wrought commercial alloys are described, with particular reference to defects. 15 ref.

**4-40. The Orientation Texture at the Surface of Cast Metals.** Gerald Edmunds. American Institute of Mining & Metallurgical Engineers Technical Publication no. 1773, 1 p.

Zinc casting solidified against a molten lead surface was found to have the same surface orientation texture, (001) parallel to the surface as other zinc and cadmium castings. Aluminum and alpha-beta brass die castings were found to have random grain orientation textures at the surface.

**4-41. Cleavage Structures of Iron-Silicon Alloys.** Carl A. Zapffe and Mason Clegg, Jr. American Society for Metals 1944 Preprint no. 37, 36 pp.

The metallographic technique referred to as fractography is applied to a series of alloys in the iron-silicon binary system. These alloys are especially suitable for this technique and provide a great number of interesting cleavage patterns, which are shown to reveal subtle intra-crystalline processes not observable with the orthodox polish and etch technique. 24 ref.

**4-42. The Effect of Cold Rolling on the Structure of Hadfield Manganese Steel.** Norman P. Goss. American Society for Metals 1944 Preprint no. 41, 10 pp.

X-ray surface diffraction diagrams of cold rolled 13% manganese strip steels given a reduction of 87% remained austenitic. In view of the X-ray evidence it is believed that the extreme hardness attainable by cold rolling is due to the smallness of the crystallites.

#### 5. POWDER METALLURGY

**5-42. Metal Powders.** *Scientific American*, v. 171, Oct. '44, p. 153.

Post-war uses for aluminum powder.

**5-43. British Electrolytic Copper Powder.** H. W. Greenwood. *Metallurgy*, v. 30, August '44, pp. 181-184.

The economic production of electrolytic copper powder in England has presented many difficulties and until recently the amount consumed in Britain was imported. As a result of research and development, during the last few years a satisfactory solution to the problem has emerged and electrolytic copper powder production is now stabilized.

**5-44. Cemented Carbides.** *Automobile Engineer*, v. 34, Sept. '44, pp. 365-371.

The methods employed in the manufacture of Wimet, among the first of the cemented carbide materials made in this country. The technique employed in preparing the powders is described. The pressing, presintering, rough machining and final sintering equipment and methods are discussed.

#### Materials Index

THE FOLLOWING tabulation classifies the articles annotated in the A.S.M. Review of Current Metal Literature according to the metal or alloy concerned. The articles are designated by section and number. The section number appears in bold face type and the number of the article in light face.

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1-126-127-130-132; 2-40; 3-179-190-191-201-203; 4-41; 6-52; 7-90; 8-84; 13-35-36; 16-131-137; 17-62; 18-232; 21-143; 26-97; 27-148.

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##### Cast Steel

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##### Miscellaneous and Minor Metals

1-125-126-129-134-135-136; 2-41; 3-204; 8-78; 9-20; 10-56-61; 26-101.

**5-45. Piston Rings.** J. A. Judd. *Automobile Engineer*, v. 34, Sept. '44, pp. 379-380.

A new and important application of powder metallurgy.

**5-46. Products from Metal Powders.** *Modern Industry*, v. 8, Oct. 15, '44, pp. 33-36.

What possibilities for new and better products does powder metallurgy offer? How important is it as a cost-saver? Answers from war experience, plus facts about limitations that potential users need to know.

**5-47. Powder Metals.** *Business Week*, no. 791, Oct. 28, '44, pp. 74-76, 77-80.

Broad outlines of the art, its major exponents, some of its many present applications to metal and alloy products, and a tentative dip into its post-war future.

#### 6. CORROSION

**6-48. Acid-Resisting Metal.** *Iron & Steel*, v. 17, August '44, p. 563.

Three-ton castings in high silicon iron.

**6-49. Atmospheric Corrosion of Elektron AZM.** J. Crowther. *Magnesium Review*, v. 4, April '44, pp. 45-50.

Atmospheric corrosion of a wrought magnesium-base alloy (Elektron AZM) as assessed by the measurement of mechanical properties after exposure for varying periods. 1 ref.

**6-50. Effects of Oxygen Exhaustion From Corrosive Solutions on High Nickel-Chromium-Molybdenum Alloy Steels.** W. E. Pratt. *Electrochemical Society Preprint* 86-5, 78 pp.

Procedures employed in discovering the causes of failures and the methods adopted for correcting unusual corrosive conditions of stainless steel alloys described.

**6-51. The Protective Influence of Manganese in the Corrosion of Aluminum-Containing Magnesium Alloys.** F. A. Fox and C. J. Rushrod. *Metallurgy*, v. 30, August '44, pp. 195-196.

High purity magnesium-base alloys, particularly those of low iron content, are much more resistant to the attack of sodium chloride solution than are commercial alloys of normal purity. It is shown that the presence of an amount of manganese in excess of a certain critical limit is able to offset the accelerating influence of iron contamination on the corrosion rate of these alloys. 9 ref.

**6-52. Corrosion Resistance of Steel.** R. M. Thomas. *Steel*, v. 115, Oct. 2, '44, pp. 74, 76, 78, 118, 120, 122, 124.

Extended through chemical treatment of electroplated zinc, cadmium and galvanized surfaces in bichromate salt bath. Method also can be applied to die castings.

**6-53. Corrosion Ratings of Metals.** *Iron Age*, v. 154, Oct. 5, '44, pp. 59-62.

Summarized corrosion data on ferrous and non-ferrous metals.

**6-54. Effect of Combined High Temperature and High Humidity on the Corrosion of Samples of Various Metals.** W. L. Maucher and B. W. Jones. *American Society of Mechanical Engineers Transactions*, v. 66, Oct. '44, pp. 624-632.

The atmosphere around and in oil refineries is corrosive, and when these refineries are located in hot humid locations, this atmosphere attacks various metals actively. Four groups of 18 selected metal specimens were subjected to this corrosive atmosphere in a refinery along the Gulf Coast. Two groups were located indoors and two groups outdoors for about one year.

#### 7. PROTECTION

**7-84. Chemically Treated Steels for Food Cans.** C. M. Cosman. *Iron Age*, v. 154, Sept. 28, '44, pp. 54-58.

German experience with phosphatized and lacquered steel sheets in can making gives interesting data on the effects of primary treatments, the influence of the bond layer and the choice of suitable lacquers. Particularly unique is the widespread use of welded cans in Germany; and additionally interesting is the longer life obtained with certain foods with phosphatized cans than with tin cans.

**7-85. Tinning Cast Iron for Babbited Bearings.** T. E. Eagan. *Metals & Alloys*, v. 20, Sept. '44, pp. 625-628.

"Kolene" process. Application to the cleaning of cast iron bearing shells prior to tinning and babbiting, and a supplementary editorial comment discusses variations of the method and other uses.

**7-86. Chemical Protection of Magnesium Alloys.** *Light Metals*, v. 7, Sept. '44, pp. 413-422.

Recent patents embodying comprehensive detail regarding fundamental theory of chromate processes and their commercial application.

**7-87. A Reappraisal of Electrogalvanizing.** Ernest H. Lyons. *Wire & Wire Products*, v. 19, Oct. '44, pp. 646-648, 732-733.

The shortcomings and the advantages of electrogalvanizing. The uniformity of the coatings, utilization of the zinc, and operating problems encountered are described. The superiority of electrogalvanizing destined it to much wider application in the future.

**7-88. Electro-Static Spraying and Detering.** Harry Forsberg. *Die Casting*, v. 2, Oct. '44, pp. 71-72, 74-75.

Electrostatic detering; electrostatic spraying. Used in spray and dip painting of die castings.

**7-89. Recent Improvements in Lead Alloy Coatings for Steel.** C. H. Hack, D. S. Kondrat and H. E. Zahn. *Metal Progress*, v. 46, Oct. '44, pp. 718-722.

War-time shortages in tin and zinc and a relative abundance of lead caused a quick conversion of many hot dip operations to the use of a lead alloy much lower in tin than the conventional terneplate coating. Formulation of a suitable flux, and a corrosion resistant lead containing the minimum of alloying constituents for successful bonding to the steel. Wide post-war use may be predicted.

**7-90. Protection of Steel Parts for Overseas Shipment.** Harold A. Knight. *Metals and Alloys*, v. 20, Oct. '44, pp. 934-940.

Modern and spectacular methods; three types of packaging; details of the methods; some newer techniques; protection against shock.

**7-91. Metallizing Non-Conductors.** Samuel Wein. *Metal Finishing*, v. 42, Oct. '44, pp. 610-613.

Bonding medium is considered to be any medium which can be applied to the given surface and the conducting medium subsequently applied to it, or may be mixed with the conducting medium and this in turn applied to the given surface. Different types of bonding mediums permit different types of processing.

**7-92. Conservation of Materials by Rust Prevention.** M. S. Clark, R. B. Thurston and Allen F. Brewer. *Machinery*, v. 51, Oct. '44, pp. 182-184.

Different methods of rust prevention; types of oils and compounds used for rust prevention; special rust-proofing oils; heavy non-drying rustproof compounds; hard-drying coatings.

#### 8. ELECTROPLATING

**8-76. A New Development in Electrodeposition of Brass.** John Kronsbein and Alan Smart. *Electrodepositors Technical Society Journal*, v. 19, '44, pp. 107-122.

General mechanical and electrical design; description of the brass plating plant; development of the brass plating process employed; large-scale production. 9 ref.

(Continued on Page 7)



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### Comment From the Press

on the National Metal Congress and Exposition

IT IS no exaggeration to say that the 1944 National Metal Congress and War Conference Display held in Cleveland was a revelation to every one of the tens of thousands who attended it. In 28 years' experience as an habitual observer of most of the conventions and shows pertaining to the iron, steel and metalworking industries we can recall no meeting or exposition which came even close to matching last week's event in interest, attendance or significance.

Thousands of technicians, executives, operating officials, educators and interested laymen came to the Metal Congress expecting to see evidences of great wartime progress in the fields of activity with which they are immediately identified. They were prepared for moderate surprises, but they were not prepared for the overwhelming spectacle which greeted them.

What they saw and heard—in exhibits, in prepared addresses and in discussions from the floor—was a panorama and a series of symposiums of unprecedented achievement not only in their own spheres of interest but in all of the ramifications of the metal working industries. The over-all effect was stupendous. The advances in materials, in processes, in equipment, in the organization of these facilities, in research and in the practical application of new knowledge are overpowering... Great and extensive as was everything connected with the Metal Congress, it still remains as only a token symbol of what the American industrial giant of 1944 really is...

Steel, Oct. 23, 1944.

### Metals on Parade

Many big companies have dropped out for the war, but small ones swelled attendance to new record at national exposition.

Elaborate display booths were noticeable by their absence at the National Metal Exposition, held at Cleveland Public Auditorium, Oct. 16 to 20. In fact, the large steel companies and the big welding equipment suppliers have eased out of the show during the war years. Their places have been taken by small businesses which swelled the total displays to 442, and attendance to more than 40,000, both records.

An outstanding trend was the further emphasis on induction heating... Crowds witnessing these demonstrations gave evidence of keen interest in the subject.

Another noticeable trend was reflected in the number of inspection devices which have been stimulated by the exacting requirements of the armed services during the war and which will, no doubt, carry over to post-war applications. Industrial X-ray, for example, was displayed in many new types of equipment particularly designed for the industrial user... The cathode-ray screen has been adapted to examine metal parts in determining such characteristics as depth of carburization, chemical analysis, internal stresses, heat treatment, or thickness of plating...

Business Week, Oct. 28, 1944.

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### Lincoln Opens Warren Season



*James F. Lincoln, dynamic and likable president of the Lincoln Electric Co., opened the Warren Chapter's 1944-45 program on Sept. 18, speaking on "Feudalism Vs. Private Enterprise". In the photograph, left to right, are L. Y. Deuchler of Mullins Mfg. Co., vice-chairman, Warren Chapter; Henry Roemer, president of Sharon Steel Co., who introduced the speaker; Mr. Lincoln; J. C. Barrett of Taylor-Winfield Corp., Chapter chairman; C. E. Stewart, Cleveland sales manager for Lincoln Electric Co.; and E. W. Husemann of Copperweld Steel Co., secretary-treasurer of the chapter.*

### Shows Development of Shells To Pierce Enemy Tank Armor

Reported by R. R. Robinson  
Technical Engineer, Colorado Fuel & Iron Corp.

How Uncle Sam's ordnance experts are meeting the necessity of adapting American weapons to counter armament developments by the enemy was related on Oct. 19 by Capt. James Colasanti, Denver ordnance officer, at a meeting of the Pueblo Group, Rocky Mountain Chapter. Capt. Colasanti prior to the war was employed at the Minnequa plant of the Colorado Fuel and Iron Corp.

Displaying a 3-in. armor-piercing shell used to knock enemy tanks out of action, Capt. Colasanti showed, through microscopic plates projected on a screen, steps taken in developing a steel shot which would have a nose sufficiently hard to crack the enemy armor and which at the same time would not cause the body, which carries the explosive charge, to crack. It was two Denver A.S.M. members, Floyd Anderson and Telmer Norman, who solved the problem, he said.

Enemy tank armor for the past two years has been face-hardened, the captain explained, so that the ordinary one-piece steel shell formerly used was not effective.

Capt. Colasanti also showed pictures of the new U. S. tank destroyer, a highly maneuverable, high speed, self-powered offensive weapon. Motion pictures were shown of actual combat scenes together with work of salvaging and repairing damaged armament. The last reel dealt with American fire-power, showing the huge 240-mm. gun which press dispatches only a few days ago announced as having been in service.

### Boston Chapter Examines Trends in Post-War Aircraft

Reported by Horace Ross  
Henry Diston & Sons, Inc.

Boston Chapter had a look at "Aircraft Trends" on Oct. 6 through the eyes of John G. Lee, assistant director of research, United Aircraft Corp. He discussed what will be possible once the aviation industry learns what the airlines and the public will want.

The personal airplane is the greatest unknown, Mr. Lee said. Today's development indicates that a two-place private plane conceivably could be had for about \$1500. The Helicopter has much promise. Commercially it will serve best as an air taxi for passengers or freight flying as a feeder for the longer air routes.

Transoceanic transport, ultimately of the flying wing type, carrying 50 to 100 passengers will fly overnight to London and in 24 hours to Moscow. Development of big, long-range planes will continue until ranges of 5000 to 7000 miles are achieved for such purpose as "police bombers" to maintain peace.

Jet propulsion and the robot type aircraft are far removed from public use. The ultimate might be a combination of an engine-driven propeller, jet propulsion and the robot type. At this point the metallurgist is important because further development will require metal for turbo-superchargers with more strength under higher temperature and corrosive attack.

Those in attendance at dinner heard a fine coffee talk by Captain V. D. Herbster, U.S.N., commander of the Naval Air Patrol for the North Atlantic Coast.

### Proposed Hardenability Specification Explained For Pittsburgh Chapter

Reported by Bartlett R. Price  
Westinghouse Electric & Mfg. Co.

L. L. Ferrall, metallurgical engineer of the Rotary Electric Steel Co., with John Mitchell of Carnegie-Illinois Steel Corp. acting as discussion leader, spoke before the Pittsburgh Chapter on Oct. 12 on "Principles and Problems in Development and Application of Hardenability Bands". Data were drawn from the studies made by the joint committee of the S.A.E. and A.I.S.I. which studied the problem of specifying steel on the basis of expected performance rather than mere chemical analysis. All data were confined to Jominy end-quench test bars.

In general, the consumer is concerned with minimum hardenability, although there are applications such as certain types of projectiles where both maximum and minimum hardenability are important.

#### Reproducibility of Results Desired

The committee was concerned with reproducibility of results from spot to spot in the heat, reproducibility from one laboratory to another, possible use of calculated hardenability curves, and reproducibility between cast and forged test bars. Although the comparisons of Jominy curves were not always excellent, it was believed the amount of agreement was satisfactory. Use could be made of both cast and forged test bars and also calculated hardenability curves.

The speaker presented data on 112 heats of NE 8740, of which 19 fell outside of the allowed variation in chemical analysis, showing the maximum and minimum in calculated hardenability limits. It was found, however, that 84% of the heats fell within the middle third of the range of calculated hardenability. This suggested that a heat of steel could have one or more elements outside of the existing permissible variation in analysis yet the steel could be within certain desired hardenability limits.

Further data on 153 heats were presented comparing calculated and measured hardenability. As a result of this work proposed bands have been set up for several grades of alloy steel giving the permissible variation in Jominy hardenability measurements. These bands have been adjusted to take into account comparisons of measured and calculated hardenability.

#### Chemical Variation Expanded

The two features of the proposed system are: (a) Expanded permissible variation in amount of each element in the analysis provided, and (b) specified hardenability limits within which the steel is to fall. The expansion in allowed limits of variation for each element is based merely on the degree of control which can be exercised on it during melting. Oxidizable elements must have wider limits, and the influence of residual elements must be considered by the manufacturer. Steels meeting the proposed specification will be denoted by the suffix H (4140 H, NE 8730 H).

Hardenability may be specified in several ways, but most methods will probably incorporate end hardness and maximum and minimum hardness values at one or more points on the bar. The consumers must still decide (with or without the aid of the supplier's technical staff) what their hardenability requirements are and what type of steel they want.

### Cold Treatment Has Definite Advantages But Not a Cure-All, Berlien Says

Reported by Herman P. Abel  
Delco-Remy Division, G.M.C.

G. B. Berlien of the Lindberg Steel Treating Co. left no doubt among those present at the October meeting of the Muncie Chapter that "Low Temperature Treatment of Metals" has a very definite place in metallurgical practice. He does not recommend this treatment as a "cure-all" to improve heat treatment of all metals, but he illustrated how it can be used to great advantage in prolonging the life of some tool steels and production steels. Mr. Berlien accompanied his talk with a new sound film entitled "Heat Treat Hints".

Chairman Hahn introduced the officers, and Rodney Hayler, a former chairman, presented the immediate past chairman, Robert Peters, with a plaque in appreciation of his services.

## Metal Literature Review—Continued

### 8. ELECTROPLATING (Cont.)

**8-77. Chromium Plating for Longer Tool Life.** R. W. Bennet and C. Hastic. *Machinery* (London), v. 65, August 31, '44, pp. 236-238.

To obtain the desired results with chromium plated tools, it is necessary to establish a common ground of understanding between tool engineers and platers so that their combined knowledge can be applied in making experiments and the reasons for success and failure fully understood.

**8-78. The Chemistry of Electroplating.** C. B. F. Young. *Products Finishing*, v. 9, Oct. '44, pp. 62-64, 66, 68, 70, 72, 74.

Copper, silver, gold, platinum, rhodium and tungsten are all below hydrogen in the electromotive series, therefore, do not displace this material from the acids, but can be dissolved only by oxidizing acids. In case of gold, it is attacked only by a mixture of hydrochloric and nitric acids.

**8-79. Lead Plating.** J. L. Bray. *Steel*, v. 115, Oct. 9, '44, pp. 128-129, 288, 290, 292.

May find increasing applications after the war in protecting steel against corrosion, since many earlier shortcomings of the process have been overcome. Smooth, uniform and dense deposits within close tolerances now being obtained.

**8-80. The Fundamentals of Chemistry for Electroplaters, XII.** Samuel Glasstone. *Monthly Review*, v. 31, Oct. '44, pp. 909-912.

The chemistry of some common acids.

**8-81. Notes on Industrial Health Hazards Connected with Cadmium Plating.** Paul A. Neal, Lawrence T. Fairhall, and K. Gustaf Soderberg. *Monthly Review*, v. 31, Oct. '44, pp. 919-920.

Inhalation of cadmium containing dusts and fumes.

**8-82. Estimation of Ammonia in Electrolyzed Cyanide Plating Solutions.** C. M. Blow, N. G. Hiscox, and M. W. Smith. *Electrodepositors' Technical Society Preprint*, v. 19, '44, pp. 147-156.

Investigation carried out in connection with the control of a conventional brass plating vat to produce 70/30 brass of a quality suitable for rubber bonding. 4 ref.

**8-83. Thickness Measurements of Electrodeposited Metals.** Richard B. Saltonstall. *Metal Finishing*, v. 42, Oct. '44, pp. 606-609, 638-639.

Quality plating specifications should call for certain minimum thicknesses on significant surfaces for various types of exposure. However, practical limitations of electroplating processes should be considered when writing such specifications.

**8-84. A Sulfate-Chloride Solution for Iron Electroplating and Electroforming.** R. M. Schaffert and Bruce W. Gonsler. *Metal Finishing*, v. 42, Oct. '44, pp. 614-616.

Investigations on iron electrodeposition were prompted by restrictions on the uses of copper and nickel in the electrolyzing and stereotyping industry. 20 ref.

**8-85. Cathode Potential, Efficiency and Throwing Power of Nickel Plating Solutions.** W. A. Wesley and E. J. Roehl. *Electrochemical Society Preprint* 86-6, Oct. 16, '44, 10 pp.

Characteristics of nickel chloride, hard nickel and Watts' plating solutions measured. Analysis of the data shows that nickel chloride and hard nickel baths should show higher throwing power than either the low pH or high pH Watts bath. Metal distribution data obtained in a Haring-Blum cell support this conclusion and tend to verify the Gardam equation for current distribution.

**8-86. Electrodeposition on the Inside of Eccentric Cylinders.** R. A. Schaefer and J. B. Mohler. *Electrochemical Society Preprint* 86-8, Oct. 16, '44, 9 pp.

Data presented on the variation of the deposit on the inside of eccentric cylinders with an internal anode. These data correlated with the theoretical current distribution between eccentric cylinders.

**8-87. A Rotating Cathode Cell for Strip Plating Evaluation.** D. A. Swalheim. *Electrochemical Society, Preprint* 86-12, Oct. 16, '44, 17 pp.

Strip plating with a rotating cathode.

### 9. ELECTROMETALLURGY

**9-15. A Study of the Possibility of Precipitation of Antimony as Oxychloride in Copper-Refining Electrolyte.** Yu-Lin Yao. *Electrochemical Society Preprint No. 86-1*, Oct. '44, 6 pp.

Chloride is an essential constituent of copper-refining electrolyte. It is well known that chlorides minimize the tendency for codeposition of antimony with copper. For many years precipitation of antimony as oxychloride has been offered as an explanation of this effect. In this paper evidences are given to show that this explanation is incompatible with facts.

**9-16. Current Efficiency Studies of the Hooker Type S Chlorine Cell.** R. L. Murray and M. S. Kircher. *Electrochemical Society Preprint No. 86-2*, Oct. '44, 27 pp.

Study to determine the relative magnitude of the various processes causing loss of current efficiency in Hooker Type S chlorine cells. Calculation of current efficiency from the oxygen and carbon dioxide content of the cell gas; relationship between current efficiency loss and various reactions occurring in the cell investigated and quantitative relationships between ion concentrations and current efficiency loss developed.

**9-17. Historic Development of Caustic-Chlorine Cells in America.** *Electrochemical Society Preprint No. 86-3*, Oct. '44, 38 pp.

Development of the American electrolytic alkali-chlorine industry extends over 100 years. Chemical and commercial difficulties had to be overcome.

**9-18. Functions of Chloride in Copper-Refining Electrolyte.** Yu-Lin Yao. *Electrochemical Society, Preprint 86-7*, Oct. 16, '44, 10 pp.

Chloride concentration of copper-refining electrolyte is correlated with the cathode polarization and with the grain size and hardness of the copper deposit.

**9-19. Graphite Anodes in Brine Electrolysis.** Neal J. Johnson. *Electrochemical Society Preprint 86-9*, Oct. 16, '44, 10 pp.

A laboratory alkali-chlorine cell closely duplicating anodic conditions in commercial brine electrolysis permitted an investigation to determine the influence of individual cell operating variables, including brine feed rate, brine concentration, anode current density, and cell temperature, on graphite anode corrosion rate.

**9-20. The Effect of Certain Variables on the Electrodeposition of Manganese.** J. H. Jacobs, P. E. Churchward and R. G. Knickerbocker. *Electrochemical Society Preprint 86-10*, Oct. 16, '44, 9 pp.

Results obtained upon the effect of certain variables on the electrodeposition of manganese, namely, time of deposition, cathode current density and cell temperature. 8 ref.

### 10. ANALYSIS

**10-55. Spectrography Makes Strides.** *Scientific American*, v. 171, Oct. '44, p. 153.

Flat-surface sparking technique.

**10-56. The Rare Earths.** R. C. Vickery. *Metallurgy*, v. 30, August '44, pp. 215-220.

Present position of the chemistry of the rare earth elements. Their nature is summarized and a general account given of methods of separation, identification and determination. Existing problems are considered, and many references to original work are given.

**10-57. Amperometric Titration.** I. J. T. Stock. *Metallurgy*, v. 30, August '44, pp. 221-224.

Amperometric titrations are directly derived from polarographic methods. These titrations have been applied with some success to a variety of inorganic estimations, using both inorganic and organic reagents. They have most of the advantages of the polarographic technique, and can be used to determine extremely small quantities of metallic ions.

**10-58. Fundamentals of Spectrographic Analysis.** H. M. P. Brinton. *Mining Journal*, v. 28, Sept. 30, '44, pp. 4-5.

Discussion of the subject for the layman.

**10-59. Modifications of Spectrographic Methods for Analysis of Aluminum and Its Alloys.** R. W. Callon and J. E. Burgener. *Optical Society of American Journal*, v. 34, Sept. '44, pp. 543-549.

Standard equipment; special equipment; standard procedures; accuracy.

**10-60. Recent Developments in Analytical Chemistry—XII.** *Chemical Age*, v. 51, Sept. 16, '44, pp. 269-273.

Potassium; calcium; a polarographic method; tungsten; germanium; spectrographic analysis; electrode improvements; inorganic chromatography. 40 ref.

**10-61. The Spectrographic Determination of Calcium in the Presence of Large Quantities of Magnesium.** C. H. Wood. *Society of Chemical Industry Transactions*, v. 63, Aug. '44, pp. 253-256.

A method is described for the spectrographic determination of calcium in magnesia by means of the high-voltage spark which gives results accurate to within  $\pm 2.5\%$  in the range 2 to 8% CaO. The method is based on the impregnated electrode technique, a nickel salt solution being used to give an auxiliary spectrum.

### 11. LABORATORY APPARATUS, INSTRUMENTS

**11-95. Wall Thicknesses.** *Iron & Steel*, v. 17, August '44, p. 565.

Instrument for accurate measurement of long tubes.

**11-96. Progress in Instrumentation.** Alexander Klemin. *Scientific American*, v. 171, Oct. '44, pp. 166-168.

The philosophy of instrument research. Should research be kept separate from production?

**11-97. Magnetic Materials.** I. F. Brailsford. *Electronic Engineering*, v. 17, Sept. '44, pp. 142-145.

Domain theory of ferro-magnetism.

**11-98. Light Alloys in Metal Rectifiers and Photocells.** *Light Metals*, v. 7, Sept. '44, pp. 437-438, 439-458.

Study of the selenium rectifier, and introducing a comprehensive discussion on photocells and the role of light metals in their construction.

**11-99. The Electron Microscope for Metals.** Robert G. Picard and Perry C. Smith. *Metals & Alloys*, v. 20, Sept. '44, pp. 636-641.

General description of the instrument, describes and illustrates some of its applications in metallographic work and an outline of its use in diffraction studies.

**11-100. The Application of Electronic Devices in the Mechanical Field.** G. A. Caldwell and C. Madsen. *Machinery* (London), v. 65, August 31, '44, pp. 225-231.

Review of the fundamentals of electronic theory, and some basic types of electronic devices.

**11-101. Electronic Control Applied to Grinding Machines.** R. A. Cole. *Machinery* (London), v. 65, Sept. 21, '44, pp. 321-323.

Four speed variables that require control: Wheel speed; work speed; infeed of the grinding wheel to the work and traverse speed. Advantages of electronic control.

**11-102. The Fundamentals of X-Ray Spectroscopy.** Donald F. Clifton. *Industrial Radiography*, v. 3, Summer '44, pp. 19-22.

The work by physicists on the theory of X-rays and the structure of the atom is one of the two main applications of the instrument, the other being chemistry where it is used both on theoretical problems and as a means of analysis.

**11-103. Electron Induction Accelerator.** D. W. Kerst. *Industrial Radiography*, v. 3, Summer '44, pp. 36-39.

Operation and uses of the betatron.

**11-104. Electric Gaging Methods for Strain, Movement, Pressure and Vibration.** Howard C. Roberts. *Instruments*, v. 17, Oct. '44, pp. 603-605, 626, 628.

Gaging methods based on variations of resistance.

(Continued on Page 8)

## How to Heat Treat Correctly The First Time Using Ryerson Test Data Furnished with All Alloy Steels

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## Metal Literature Review

### 11. LABORATORY APPARATUS, INSTRUMENTS (cont.)

**11-105. Electron Tubes—Their Principles and Their Instrumentation Applications.** Andrew W. Kramer. *Instruments*, v. 17, Oct. '44, pp. 606-611, 618, 620, 622, 624, 626.

Tube data; amplifier classifications; electronics in the field of measurement.

**11-106. Determining the Thickness of Linings of Steel Plate.** N. M. Thornton. *Industrial Chemist*, v. 20, Sept. '44, pp. 466-468.

Describes an instrument which will determine the thickness of the protective lining from one side only, dispensing with the necessity for drill tests or removing sections of the lining for inspection.

**11-107. The Application of Electronic Devices in the Mechanical Field.** G. A. Caldwell and C. Madsen. *Machinery* (London), v. 65, Set. 7, '44, pp. 265-268.

Description of photo-, X-ray and cathode-ray tubes. Description of simple instrument which has proved highly successful in industrial practices.

**11-108. Simple Interferometer for Surface-Quality Measurement.** L. Leinert. *Werkstatstechnik Der Betrieb*, v. 37/22, no. 7, July '43, pp. 279-280. *Engineers' Digest*, v. 1, Sept. '44, pp. 572-573.

Description of simple instrument which has sufficient range and accuracy to be useful in many metallurgical problems that depend upon continuous cooling behavior. 12 ref.

### 12. TESTING, INSPECTION AND RADIOGRAPHY

**12-252. The Relationship Between Brinell and Vickers Hardnesses and Tensile Strength.** Heinrich Staudinger. *Stahl und Eisen*, v. 63, '43, pp. 537-539. *Alloy Metals Review*, v. 3, March '44, p. 2.

Comparisons were made with three carbon steels, containing 0.17 to 0.6% C, and with four alloy steels containing C 0.2 to 0.36, Mn 0.5 to 1.4, Cr 1.3 to 2.4, Mo 0 to 0.4, Ni 0 to 1.7 and V 0 to 0.3% in the annealed and heat treated conditions. Brinell hardnesses were measured with the 10, 5 and 2.5-mm. balls. Vickers measurements were made with a 50-kg. load. The tensile strength of the steels ranged from approximately 70,000 to 215,000 psi. Curves show variations ranging from 2 to 10% and averaging 4.5%.

**12-253. Tension Stresses—Part III.** F. Laszlo. *Iron and Steel Institute Advance Copy*, August '44, 23 pp.

Characteristic component system of tensioned stresses due to crystal anisotropy analyzed for metals with cubic, hexagonal or tetragonal lattices. Effect of tensioned stresses on thermal constants studied. Irreversibility and hysteresis may be involved. Question of modification, i. e., reduction, of tensioned stresses and their influence on density discussed.

**12-254. Torsion Strain.** *Automobile Engineer*, v. 34, July '44, p. 294.

Determination of the stress concentration factor of fillets on stepped shafts.

**12-255. Distribution of Shear Strength of Spot Welds in Various Aluminum Alloys.** Translated by R. F. Tylecote and Angela Lias from the German of F. Bollenrath and V. Hauk. *Welding Journal*, v. 23, Sept. '44, pp. 435-s-442-s.

Aluminum alloys investigated included those containing magnesium, copper and magnesium, and also magnesium and zinc. 19 ref.

**12-256. Coordination of Research and Testing Activities in the Aircraft Industry.** Maurice Nelles. *Welding Journal*, v. 23, Sept. '44, pp. 454-s-457-s.

Nature of the research activity.

**12-257. Behavior of Residual Stresses Under External Load and Their Effect on Strength of Welded Structures.** *Welding Journal*, v. 23, Sept. '44, pp. 473-s-480-s.

A basic experimental study of effect of residual stresses on the strength of the base metal in welded constructions subjected to static, repeated or vibration loading. Effect of high welding current intensity on the strength of the base metal. Effect of premature plastic deformation produced during loading, on the safety of the welded structures.

**12-258. Relationship of Brinell Hardness and Yield Stress.** T. W. Ruffie. *Iron Age*, v. 154, Sept. 28, '44, pp. 50-53.

Data whereby the yield stress of certain cast steels may be accurately checked by a non-destructive test, such as the Brinell hardness test.

**12-259. Metallurgical Examination of Light Alloy Cylinder Heads from German Aircraft.** *Foundry Trade Journal*, v. 74, Sept. 7, '44, pp. 9-10, 14.

Chemical composition; macrostructure; microstructure; comments.

**12-260. Industrial Radiography.** V. E. Pullin. *Foundry Trade Journal*, v. 74, Sept. 7, '44, pp. 13-14.

Photographic technique; interpretation.

**12-261. The Significance of Tensile and Other Mechanical Test Properties of Metals.** Hugh O'Neill. *Institution of Mechanical Engineers Journal*, v. 151, Sept. '44, pp. 116-130.

Critical consideration of the conventional quantities obtained from the tensile test reveals their limitations for design purposes, especially where notch-fatigue effects predominate. Against such notch-fatigue the importance of high work-hardening capacity in a metal is emphasized, and its relation to tensile elongation behavior outlined. Even conventional tensile records may yield some rough measure of work-hardening capacity prior to cracking by means of quantities which have here been called "plasticity ratio" and plasticity value.

## Pearlite at 6,000, Aluminum at 12,000, Seen in Electron Microscope Are Metallurgist's Dream

Reported by A. F. Whalen  
Metallurgist, Harrisburg Steel Corp.

Fifty-eight electron microscopes have been manufactured and delivered to users, Perry C. Smith of the RCA Victor Division told the York Chapter, meeting in Waynesboro on Oct. 11. The applications of this microscope have been under the supervision of the War Production Board and at present they are all actively engaged in war work.

The electron microscope is similar to the light microscope with light source, objective and eye-piece, but it has no glass lenses. Electrons provide the source of illumination, and the lenses consist of electromagnetic fields. Focusing and lens adjustments are made by simply controlling the current flowing in the magnetic lens windings. Electrons are refracted by an electromagnetic field just as light waves are bent on passing through glass lenses. The rays activate the emulsion of a photographic film.

Each class of specimen for examination in the electron microscope requires its special technique. Electrons will not penetrate materials thicker than about 1 micron, so specimens are generally mounted on very thin films of collodion which in turn are mounted on thin grids of stainless steel. The materials which are observable in the microscope are those

appearing within the holes of the stainless steel supporting grids.

A special replica technique has been evolved for the examination of etched metals. Polystyrene is pressed into the surface of the material under 3000 lb. pressure. After hardening, the polystyrene is knocked loose from the metal sample. The polystyrene negative is then coated with an evaporated silica film. The silica film, a positive of the original surface, is examined under the electron beam and the hills and dales of the original metal surface are faithfully recorded on the photographic plate.

Mr. Smith's pictures of pearlite and martensite at 6000 or more magnifications formed a metallurgist's dream, to which superlatives cannot do justice.

Magnifications of aluminum at 12,000 diameters are sharper than the ordinary hand camera could produce of an ordinary landscape and 100,000 magnifications are still sharp and full of detail.

### Delloy Appoints Cleveland Representative

The Betz-Pierce Co., Cleveland, has been appointed as exclusive representative and distributor of Delloy tools in northern Ohio and western Pennsylvania, according to announcement by Delloy Metals of Philadelphia.

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Quick change laps are 12" diameter providing high and low speeds. Standard sizes are 12", 14", 16", 18", 20", 22", 24", 26", 28", 30", 32", 34", 36", 38", 40", 42", 44", 46", 48", 50", 52", 54", 56", 58", 60", 62", 64", 66", 68", 70", 72", 74", 76", 78", 80", 82", 84", 86", 88", 90", 92", 94", 96", 98", 100", 102", 104", 106", 108", 110", 112", 114", 116", 118", 120", 122", 124", 126", 128", 130", 132", 134", 136", 138", 140", 142", 144", 146", 148", 150", 152", 154", 156", 158", 160", 162", 164", 166", 168", 170", 172", 174", 176", 178", 180", 182", 184", 186", 188", 190", 192", 194", 196", 198", 200", 202", 204", 206", 208", 210", 212", 214", 216", 218", 220", 222", 224", 226", 228", 230", 232", 234", 236", 238", 240", 242", 244", 246", 248", 250", 252", 254", 256", 258", 260", 262", 264", 266", 268", 270", 272", 274", 276", 278", 280", 282", 284", 286", 288", 290", 292", 294", 296", 298", 300", 302", 304", 306", 308", 310", 312", 314", 316", 318", 320", 322", 324", 326", 328", 330", 332", 334", 336", 338", 340", 342", 344", 346", 348", 350", 352", 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## Metal Literature Review—Continued

### 12. TESTING & INSPECTION (cont.)

**12-262. Cartridge Brass; Special Properties and Physical Testing.** L. E. Gibbs. *Metal Progress*, v. 46, Oct. '44, pp. 699-704.

Notes and precautions are given on the testing of cartridge brass, discussing particularly the three current methods of determining "yield point." Creep strength is probably the best if not the only logical criterion for design of those copper-base alloys that have to carry steady loads.

**12-263. Endurance of NE Steels in 13/4-in. Specimens.** O. J. Horger and T. V. Buckwalter. *Metal Progress*, v. 46, Oct. '44, pp. 727-729.

Fatigue tests on notched and unnotched specimens of S. A. E. 4340, NE8744, NE8949, and NE9445.

**12-264. Dependability of Engineering Property Tests.** H. A. Reece. *Steel*, v. 115, Oct. 9, '44, pp. 130-132, 296, 298.

In testing metals for physical characteristics, it behooves the engineer to ascertain which tests are truly representative, sufficient in number and thoroughly reliable. Tests for single characteristic often more dependable.

**12-265. Specification on Performance.** *Steel*, v. 115, Oct. 9, '44, pp. 180-182, 185, 188.

Overwhelming majority of plants favor purchase of materials on basis of physical characteristics rather than chemical analysis. Hardenability band data already available for many National Emergency and alloy steels.

**12-266. X-Ray Inspection Detects Faulty Repair Job.** Herbert F. Scobie. *American Foundryman*, v. 6, Oct. '44, p. 21.

Describes an unsuccessful attempt to salvage a steel casting by welding.

**12-267. New Developments in Die Materials.** Richard Bredenbeck. *Iron Age*, v. 154, Oct. 12, '44, pp. 60-61, 66.

The correlation in chart form of the impact strengths of a great number of die materials has resulted in substitutions not previously made. The result has been dies of much longer life for certain operations, which show no pick-up and which run without touch-up for much longer periods.

**12-268. Selection of Automotive Steel on the Basis of Hardenability.** A. L. Boegehold. *SAE Journal*, v. 52, Oct. '44, pp. 472-485.

Principles of selecting steel on the basis of hardenability. Customary procedures as to hardness requirements in the as-hardened condition to ensure a desirable structure after tempering.

**12-269. Hardness Conversion Tables.** *Machine Design*, v. 16, Oct. '44, pp. 109-111.

Because numerous different hardness scales are in general use, it often is difficult to compare the relative hardness of metals which have been tested with different measuring devices. To aid the designer in making such comparisons, the conversion tables are presented in this data sheet, together with a brief discussion of indentation hardness tests.

**12-270. Fluorescent Penetrant Inspection.** Greer Ellis. *Steel*, v. 115, Oct. 16, '44, pp. 100-102, 164.

Methods for non-magnetic and non-destructive testing to determine minute surface faults have been greatly improved by recent developments, some of which are outlined here with details showing typical applications.

**12-271. X-Ray Inspection Reveals Stopper Head Defects.** Clyde B. Jenni. *Steel*, v. 115, Oct. 16, '44, p. 104.

Successful pouring of heats of steel is dependent on stopper rod assembly. Inspection of stopper heads with long wave-length, low power X-rays uncovers defects which may result in troublesome pouring. Short exposure is sufficient for satisfactory negative.

**12-272. Spotting Cobalt High Speed.** Victor F. J. Tlach. *Metal Progress*, v. 46, Oct. '44, p. 714.

Two schemes for distinguishing tungsten high speed toolsteel from the varieties containing cobalt.

**12-273. Bend Tests Above Room Temperature.** C. F. Sawyer. *Metal Progress*, v. 46, Oct. '44, p. 714.

By keeping the bend specimens at the proper temperatures until the test actually starts, having the fixture warm, and making the test on a hot anvil, the temperature at the time of testing could be relied upon.

**12-274. Statistical Quality Control.** Vernon R. Grom and Martin A. Brumbaugh. *Aero Digest*, v. 46, Sept. 15, '44, pp. 110-112, 136, 138, 143.

Technique developed to reduce faults in assembly operations, to speed up production and to establish sampling inspection procedure which will assure the most economical control over the quality of incoming materials.

**12-275. Development of a Monochromatic Radiographic Method for Locating Small Defects in Aluminum Alloy Castings.** *Industrial Radiography*, v. 3, Summer '44, pp. 13-18.

The use of molybdenum radiation in the radiographic study of light metals and alloys has certain advantages over the use of tungsten radiation, even when the X-ray tube with tungsten target is operated at the relatively low voltages of 30 to 40 kilovolts. 18 ref.

**12-276. Radium Radiography of Thin Steel Sections.** A. Morrison and E. M. Nodwell. *Industrial Radiography*, v. 3, Summer '44, pp. 30-31.

Radium radiography has been successfully used on the welds in pressure vessels of wall thickness  $\frac{1}{2}$  to 1 in. where it was not possible to take them to an X-ray machine, or to bring an X-ray unit to them.

**12-277. Use of Film to Measure Exposure to Gamma Rays.** A. Morrison and E. M. Nodwell. *Industrial Radiography*, v. 3, Summer '44, pp. 31-32.

The essential basis of this method is the establishment of a relationship between the amount of radiation received by a film and the blackening of the film thus produced. This relationship can then be used to determine the amount of radiation received by persons carrying film, and if the amount of radiation in a tolerance dose is agreed upon, the safety, or otherwise, of working conditions will be known.

**12-278. A Renaissance of Mechanical Properties.** A. C. Vivian. *Institution of Mechanical Engineers Journal*, v. 151, Sept. '44, pp. 105-113.

True stress-strain diagram; effect of change in one property; effect of stress designations.

**12-279. Crack Detection.** *Machinery* (London), v. 65, Sept. 7, '44, pp. 253-256.

Reynolds electro-magnetic equipment for the inspection of welded tubular structures.

**12-280. Exposure Graphs for Radium Radiography of Steel.** A. Morrison and E. M. Nodwell. *Industrial Radiography*, v. 3, Summer '44, pp. 23, 26-29.

The relationships between gamma-ray exposure, thickness of steel, and film density for each of several types of film investigated.

**12-281. Using the Jominy Test to Predict Physical Properties after Tempering.** Earl R. Weiher. *Steel*, v. 115, Oct. 23, '44, pp. 90, 94.

Simple tests also accurately determine hardening temperature of quenched steel for predetermined hardness and strength.

**12-282. Yield Point and Stress Distribution in Bars and Tubes Due to Plastic Bending.** Eric Bernhult. *Jernkontorets Annaler*, v. 127, no. 10, Oct. '43, pp. 491-533. *Engineers' Digest*, v. 1, Sept. '44, pp. 555-563.

No actual increase in the yield point takes place in bending, the stress conditions being determined by the tensile strength properties of the material. The appearance of the stress distribution characteristic through the cross section will depend upon whether the material has a pronounced lower and upper yield point, or no marked yield point at all.

**12-283. Modern Hardness Testing Machines.** Kurt Meyer. *Fertigungstechnik*, v. 1/77, no. 9, Dec. '43, pp. 232-234. *Engineers' Digest*, v. 1, Sept. '44, pp. 577-578.

Machines for external Brinell and Vickers hardness measurements.

### 13. TEMPERATURE MEASUREMENT AND CONTROL (PYROMETRY)

**13-35. Liquid-Steel Temperatures in Open-Hearth Furnaces.** D. Manterfield. *Engineering*, v. 158, Sept. 8, '44, p. 185.

Temperature explorations in the larger type of basic open-hearth furnace.

**13-36. Liquid-Steel Temperatures in Open-Hearth Furnaces.** D. Manterfield. *Engineering*, v. 158, Sept. 15, '44, p. 205.

The relative slag and metal temperatures.

### 14. FOUNDRY PRACTICE AND APPLIANCES

**14-335. The Use of Leaded Gun-Metal for the Production of Castings to Withstand Pressure.** Frank Hudson. *Institute of Metals Journal*, v. 70, August '44, pp. 407-422.

Practical tests in foundries with a view to collecting data on gun-metals more suited to the production of pressure castings than the standard copper-tin-zinc alloys normally employed for this purpose. Evidence was obtained which shows that leaded gun-metal containing approximately tin 7, zinc 5, lead 5%, balance copper, with or without a nickel addition, is more adaptable to the production of pressure-tight castings of variable section than other lead-free or low-lead-content alloys. 5 ref.

**14-336. The Side Feeding of Steel Castings.** B. Gray. *Iron and Steel Institute Advance Copy*, July '44, 13 pp.

Rate of increase in wall thickness less on vertical than on horizontal walls, and different when the head is applied at the bottom; crystalline structures differ and two forms of solid result. Convection currents play an important part, and, in turn, are affected by the size and shape of casting. Distribution of the secondary segregated material of lower melting point has important effects in feeding. Atmospheric pressure also important. Mechanism of freezing explains why side heads are less effective with cold steel. Assessment of the efficiency of various methods of feeding when considered in the light of the experiments described. 4 ref.

**14-337. A Foundryman's Notebook.** Scribe. *Iron & Steel*, v. 17, August '44, pp. 564-565.

Fitness for purpose of patterns and cores.

**14-338. Malleable Melting.** J. H. Lansing. *Iron & Steel*, v. 17, August '44, pp. 576-580.

Consideration of operating phases in American practice.

**14-339. Automobile Castings.** *Automobile Engineer*, v. 34, August '44, pp. 315-323.

Properties and uses of Chromidium, Monikrom and Cromol for cylinder blocks and heads, crankcases and brake drums, camshafts and crankshafts. Layout and organization of the North Works foundry described.

**14-340. Steel Mixes and Inoculants in Grey Cast Iron.** W. Barnes and C. W. Hicks. *Foundry Trade Journal*, v. 73, August 10, '44, pp. 287-292.

Melting practice; cupola design; control of test-bars; increasing steel; cost of ladle addition per ton of metal.

**14-341. An Outline of Gravity Die-Casting.** M. R. Hincliffe. *Foundry Trade Journal*, v. 73, August 10, '44, pp. 293-297.

Survey of development in its application. Bottom running; vertical strip runner; swan neck choke venting; feeding heads—solidification stage; controlled rate of cooling; progressive solidification; die construction; collapsible cores; loose pieces; sand cores; die wall thickness; die foundry plant; melting furnaces.

**14-342. Centrifugal Casting.** Edwin F. Cone. *Scientific American*, v. 171, Oct. '44, pp. 151-153.

Occupies prominent position in the metal industry; offers advantages of economy in metal and machining cost; forte is in the pipe and tubing fields, but can be applied to the production of shapes other than cylindrical.

**14-343. Mechanized Foundries.** *Automobile Engineer*, v. 34, July '44, pp. 271-274.

Mechanical methods and devices for handling materials.

**14-344. Cast Pistons.** *Automobile Engineer*, v. 34, July '44, pp. 279-286.

Methods and equipment employed for ingot making, core making, sand core-metal chill casting and die-casting.

(Continued on Page 11)

## EXTRA SENSITIVITY FOR COUNTING SMALL PARTS

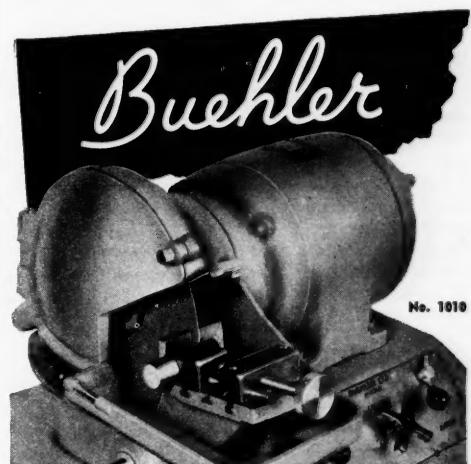


• Specially designed for today's needs in quickly and accurately counting quantities of very small parts for stock, receiving, shipping, or inventory. Indicator travels 4" per pound. 3/64 oz. in large scoop causes perceptible indicator movement. Counting capacity to 25 lb.

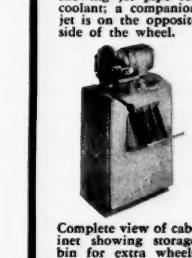
Other models in complete Toledo Counting Scale line for all requirements up to heaviest capacities. Send for booklet "Counting By Weight". Toledo Scale Company, Toledo, Ohio.

## TOLEDO SCALES

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### New 1 H.P. CUT-OFF MACHINE



A laboratory size cutter with ample power for fast cutting of samples up to 1" in diameter.

This cut-off machine is built with the usual Buehler emphasis on precision in both the construction of the machine itself and the work it performs. The controls are arranged for the utmost convenience of the operator — a feature that contributes to speed and accuracy in cutting samples.

The cutting wheel mounted directly on the ball bearing motor shaft is free from side play or vibration and is cooled by a stream of coolant directed on both sides of the wheel under the guard.

The cutting is done on the front of the wheel by using the long lever handle to raise the clamp base holding the sample to contact the wheel. This mechanism is balanced so that pressure against the cutting wheel is under perfect control at all times by the operator. A metal splash guard, removed in the illustration, furnishes protection from spray.

Overall dimensions are 24" x 28" x 50". Shipping weight, 575 lbs.

**THE BUEHLER LINE OF SPECIMEN PREPARATION EQUIPMENT INCLUDES . . . CUT-OFF MACHINES • SPECIMEN MOUNT PRESSES • POWER GRINDERS • EMERY PAPER GRINDERS • HAND GRINDERS • BELT SURFACERS • POLISHERS • POLISHING CLOTHS • POLISHING ABRASIVES**



Mention R600 When Writing or Using Reader Service.

## L. S. Bergen Leaves Crucible To Form Precision Castings, Inc.

Lewis S. Bergen, newly elected A.S.M. trustee, has announced the formation of Bergen Precision Castings, Inc., Pleasantville, N. Y., of which he is president. Mr. Bergen is resigning as associate director of metallurgy and research for Crucible Steel Co. of America, a position he has held since 1938. He has been with Crucible since 1928, graduating from Lehigh University in 1925 and working at Bethlehem Steel Corp. for three years.

Mr. Bergen has been prominently associated with the high temperature alloys and specialty carbon, alloy, stainless, and tool steels for the past 19 years. He has served actively on government, industry and technical society committees too numerous to list.

The Bergen organization is an association of outstanding steel and alloy metallurgists, ceramic engineers and technicians skilled in the new and rapidly expanding field of precision castings, whose objective is the scientific development of this process to higher quality standards than now available.



Lewis S. Bergen

## Carl Claus Dies Suddenly, Was Pioneer in Powder Metallurgy

The sudden death of Carl Claus, vice president in charge of research, Bound Brook Oil-Less Bearing Co., was announced on Oct. 5, after his sixtieth birthday.

Dr. Claus was associated with the company 23 years, and was one of the first to carry on sustained research in the art of powder metallurgy. Born in Germany, Dr. Claus was graduated from the University of Berlin, where in 1910 he received the degree of Doctor of Engineering. He became a citizen of the United States in 1921.

Robert Ahrens

Robert S. Ahrens, vice-president in charge of engineering for Seeger Refrigerator Co., Saint Paul, Minn., died Oct. 4 as a result of injuries suffered a week earlier in a fall. Born in 1890 in Cincinnati, Mr. Ahrens had been employed by the Seeger Co. for 25 years.

## Mass Production Breaks Down Secrecy in Sheet Fabrication

Reported by George Kappelt  
Metallurgist, Bell Aircraft Corp.

The advancement in recent years of the metallurgy of hot and cold rolled sheets has been entirely due to mass production by the large fabricators and the ever increasing demands made by the designers upon a piece of metal. This type of production has broken down the barriers of secrecy in the manufacture and fabrication of sheet stock. This, according to George B. Nisbet, service metallurgist of Bethlehem Steel Co., guest speaker at the first fall meeting of the Buffalo Chapter, erroneously leads one to forget that there are still many difficulties at all times to be encountered in deep drawing sheet manufacture.

Chemistry, surface conditions, rolling technique—all vary the usability of the finished product. Die design, material, finish and lubrication must be worked out for every drawing job that is to be performed.

Mr. Nisbet further pointed out that for deep drawing steels impurities of tin are extremely detrimental, and even chromium, copper, and nickel are to be avoided. Aluminum killed steels are extremely satisfactory for deep drawing.

Rolling must produce a surface which is suited to the finish which will be applied to the article. A dull matte surface is more desirable because it will hold a film of oil, create better control of pressure on the blank and will not show scratch marks as readily during handling and when drawn.

Rolling, accompanied by proper annealing cycles, must produce a slightly elongated grain without grain growth. Mr. Nisbet has found that sheets with approximately 80 to 100 grains per inch, having a Rockwell hardness of approximately B-43, have good drawing qualities without producing an orange peel effect or causing excessive spring-back.

## Hardening Principles Applied to Annealing Shorten Time Cycle

Reported by G. H. Enzian  
Research Metallurgist, Jones & Laughlin Steel Corp.

Peter Payson, assistant director of research for the Crucible Steel Co. of America, brought the Pittsburgh Chapter up to date on the subject of annealing on Sept. 21 in an extremely interesting account of theoretical metallurgy at work. Through the use of a number of carefully selected slides he clearly showed that softening of steel has finally graduated from the age-old practice of heating to a high temperature and then cooling as slowly as possible, to a truly exact science. By means of the annealing principles he set forth, softening of steel can be accomplished in far less time and often with better results than, as Burns George, the discussion leader, expressed it, "the old-fashioned way".

### Softening Process a Matter of Minutes

Mr. Payson pointed out that the original conception of the annealing process stemmed from the ancient belief that hardness was associated with the physical act of cooling and that the faster the rate of cooling, the harder would be the steel. In the light of present knowledge, of course, this reasoning is not correct and hardness depends solely on the mode of transformation of austenite.

Therefore, why spend days slow cooling steel from the austenitizing temperature when the actual softening process, in most cases, is a matter only of minutes or hours? The catch, of course, is in knowing exactly through what temperature range and at what rate the steel must be cooled to obtain the soft transformation products; this is where the art of annealing gives way to the science of metallurgy.

Isothermal transformation curves, which Mr. Payson prefers to call "TTT" curves (transformation-temperature-time) rather than S curves, are just as useful to scientific softening processes as they are for other heat treatments designed to harden the product. By superimposing cooling curves over the TTT curve for the steel, it is evident that since no transformation takes place until the temperature falls below the critical, there is no need to cool slowly from the highest temperature to this point.

### Cool 50° Below Transformation

By eliminating slow cooling through this range, several hours in the heat treating cycle can be saved. In addition, it is also evident that slow cooling below the temperature of final transformation is only wasting time and therefore this phase of the treatment can also be eliminated with further saving in time. Thus the entire annealing cycle can be shortened considerably with no detriment to the quality of the product.

To be safe, however, Mr. Payson advises that the controlled cooling cycle should be carried to a temperature of approximately 50° F. below that indicated for the end of transformation from the TTT curve. He demonstrated that the closer the austenitizing temperature is to the critical, the more likely will the transformation product be spheroidal. Another factor to be considered in determining the type of transformation product formed is the effect of preheating below the critical before austenitizing.

At the conclusion of Mr. Payson's talk there could be no doubt left that the softening of steel must be considered as much a science as the hardening of steel. After all, it could just as well be argued that hardening is no problem—just get the steel hot and quench it. But then, who wants to start an argument.

## Jominy Discusses End-Quench Test

Reported by A. H. Rauch  
Deere & Co.

Use of the end-quench test in determining whether a particular heat of the selected type would meet the requirements and how the hardenability may be specified by means of the end-quench test were the principal points brought out by Walter E. Jominy of Chrysler Corp., Dodge Chicago Plant, speaking before the Tri-City Chapter on Sept. 12. He pointed out that a proper understanding of hardenability will result in a proper and economical choice of steel for specified performance.

The L-type bar for determining the hardenability of shallow hardening steels was described. Mr. Jominy pointed out the suitability of this test for evaluating and predicting the hardenability of carbon tool steels and carburizing steels.

## Horger Tells Metallurgists Essentials of Design & Fatigue

Reported by J. L. Petz  
Chief Engineer, Electromatic Typewriters, Inc.

"What the Metallurgist Should Know About Design" was expounded by O. J. Horger, in charge of railway engineering and research, Timken Roller Bearing Co., before the first meeting of the season of the Rochester Chapter.

Practically all design members that break are fatigue failures, Dr. Horger said, and the proper shape of the design member is of first importance. A poor shape—that is the presence of sharp fillets, notches, holes, press fits and the like—seriously limits means available to the metallurgist for correcting failures. After establishing the proper shape, the problem is then a question of obtaining adequate fatigue strength through selection of steel, heat treatment, and special surface preparations.

Of all the usual mechanical and metallurgical tests there are none which measure fatigue resistance other than the fatigue test itself. Yet many engineers select their designs and material specifications with utter disregard of fatigue characteristics. Even when fatigue is considered it is erroneously measured, in that the fatigue strength is obtained on a polished unnotched small specimen. The test should preferably be made on the actual design member so as to involve the influence of all processing operations. If this is not possible then a notched specimen should be used which simulates the stress concentration of the actual part.

A number of examples of design members were cited to show how industry is applying residual stresses to increase fatigue resistance. These residual stresses are obtained by some form of cold working or thermally by heat treatment. Shot peening and burnishing methods are most commonly used to obtain increases in fatigue resistance ranging as high as 100%. The metallurgist too seldom realizes the favorable influence of the proper residual stresses obtained through heat treatment and must give this subject more study if he is to obtain the optimum fatigue resistance without increasing the size and weight of design members.

Preceding Dr. Horger's lecture Vernon H. Patterson outlined the educational program on "Fundamentals of Metallurgy" starting Oct. 23rd at the University of Rochester Engineering Building.

## Tremendous Advance Made In Aluminum Foundry Practice

Reported by Carl H. Muehlemeyer  
Metallurgist, O. T. Muehlemeyer Heat Treating Co.

The post-war trends in quality of aluminum castings were particularly stressed in an excellent paper presented by Alan Brantingham of the Ebaloy Foundries before the Rockford Chapter A.S.M. on Sept. 27.

Although many difficulties were encountered in attaining castings of sufficiently high physical properties and soundness to meet the present rigid aircraft and ordnance specifications, the solution of these problems resulted in tremendous advancement of foundry practice. Hence it is now easier to make castings to wartime specifications than it was formerly to make the inferior pre-war article.

Consumers of present-day aluminum castings find them cheaper than pre-war castings in the finished stage because there is less scrap loss, less and often lower machining costs, and fewer rejections. Mr. Brantingham therefore predicted that post-war quality standards will be as high or higher than at the present time.

While Mr. Brantingham does not share the view that after the war "everything" will be made from aluminum, some startling uses are nevertheless coming into being. Post-war plans for a building in New York call for aluminum structural members in place of steel. The estimators calculate that lower erection costs would more than make up for the higher cost of the material.

A much more widespread use of aluminum in the future is logical also in view of the newer alloys, one of which on test now shows an ultimate strength of 80,000 psi. with an elongation of 14 to 16%. Mr. Brantingham cautioned against over-rating these alloys, however, because they may possess inferior corrosion resistance or corrosion fatigue or may present objectionable fabricating problems.

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# A.S.M. Review of Current Metal Literature—Continued

## 14. FOUNDRY PRACTICE (Cont.)

**14-345. Malleable Cast Iron.** III. J. A. Wyde. *Metallurgia*, v. 30, August '44, pp. 191-195.

Important aspects of production and emphasizes the need for provision and maintenance of first-class patterns and molding equipment. Molding and core sands briefly discussed, and various melting processes summarized, especial attention directed to air- and open-hearth furnace processes. The annealing of whiteheart and blackheart malleable iron castings also briefly described.

**14-346. Steel Foundry Pouring Practice.** John Howe Hall. *Foundry*, v. 72, Oct. '44, pp. 74-75, 210, 212, 214, 216.

Advantages and disadvantages of different types of ladles used in pouring steel, methods of correcting leaks in nozzles of bottom pour ladles, and proper operating procedure in pouring.

**14-347. Patterns of Gypsum Cement.** E. H. Schleede. *Foundry*, v. 72, Oct. '44, pp. 76-77, 224, 226, 228.

Successful production of patterns from gypsum cement.

**14-348. Efficient Utilization of Compressed Air in the Foundry.** J. L. Yates. *Foundry*, v. 72, Oct. '44, pp. 80-81, 238.

Phases of efficient use of compressed air plant; size and arrangement of air piping and receiver layout; greatest utilization of compressed air devices; proper maintenance of the compressed air system; proper maintenance of the various foundry devices that use compressed air.

**14-349. Gray Iron—Steel Plus Graphite.** James T. MacKenzie. *Foundry*, v. 72, Oct. '44, pp. 86-88.

Ratios of modulus of rupture to tensile strength.

**14-350. Convert Garage Into a Foundry.** *Foundry*, v. 72, Oct. '44, pp. 90-93, 222.

Plant layout and operation.

**14-351. The Development and Production of Inoculated Cast Iron.** H. P. Hughes and W. Spenceley. *Foundry Trade Journal*, v. 73, August 31, '44, pp. 349-354.

Experiments to overcome current difficulties of the iron founder. Structure of raw materials; problem of distortion; introduction of inoculants; size and type of inoculant.

**14-352. The Injection of Metal Into Die Casting Dies.** H. K. Barton. *Machinery (London)*, v. 65, August 31, '44, pp. 245-249.

Velocity during the first phase is relatively low, and the sharp increase of viscosity as the advancing metal stream contacts the cooler cavity surface tends to maintain stable conditions of flow. In the second phase, the velocity of the injected metal is higher, and it flows over an already deposited layer which, acting as a thermal insulator, effectively prevents any large increase in viscosity.

**14-353. The Development and Production of Inoculated Cast Iron.** H. P. Hughes and W. Spenceley. *Foundry Trade Journal*, v. 74, Sept. 7, '44, pp. 3-7.

Improved results shown; simpler melting practice.

**14-354. Speed of Rotation in the Centrifugal Casting Process.** J. E. Hurst. *Engineering*, v. 158, Sept. 8, '44, pp. 198-200.

The rotational speed is of first importance in its effect upon the efficiency of operation, the quality of the casting, and the design and construction of the casting machine.

**14-355. Centrifugal Casting of Steel.** S. D. Moxley. American Society of Mechanical Engineers *Transactions*, v. 66, Oct. '44, pp. 607-614.

The three methods generally used are true centrifugal castings, semi-centrifugal casting, and centrifuging. A description of each method, the work for which it is best adapted, the machines used, details of molds, and physical properties of the resulting products.

**14-356. Centrifugal Casting of Non-Ferrous Metals.** I. E. Cox. *Western Metals*, v. 2, Oct. '44, pp. 32, 35-36.

Babbitt bearing; gun bronze bearing; high lead bronze.

**14-357. First Report on the Basic Cupola by the Melting Furnaces Sub-Committee.** *Foundry Trade Journal*, v. 74, Sept. 14, '44, pp. 25-28.

Examination of results obtained in practice with basic-lined cupolas. 3 ref.

**14-358. The Development and Production of Inoculated Cast Iron.** H. P. Hughes and W. Spenceley. *Foundry Trade Journal*, v. 74, Sept. 14, '44, pp. 31-35, 30.

Underlying theories; early difficulties; influence of casting temperature.

**14-359. Casting Technique for Lead Base Babbitt Alloys.** R. G. Thompson. *Metal Progress*, v. 46, Oct. '44, pp. 739-742.

Centrifugally cast bearings; still or stationary cast bearings; bonding quality of lead babbitt; oil corrosion.

**14-360. High-Strength Centrifugal Castings.** Stanley P. Perry. *Iron Age*, v. 154, Oct. 5, '44, pp. 52-53.

Recent research resulting in centrifugally cast steels having strengths on the order of 180,000 psi., and a ductility of 10%.

**14-361. Precision Castings Employing Dental Technique by Investment Molding Process.** Robert Neiman. *American Foundryman*, v. 6, Oct. '44, pp. 7-15.

New type of centrifugal casting machine for multiple molds and compares the cost of precision castings with sand castings. 23 ref.

**14-362. AS-Cast Test Bar Provided Through Investigation by A.S.T.M. for Copper-Based Alloy Castings.** *American Foundryman*, v. 6, Oct. '44, pp. 16-18.

Various test bars used for testing copper-base alloys.

**14-363. Precision for Airflow.** E. A. Rullison. *Die Casting*, v. 2, Oct. '44, pp. 38-39, 61.

It is believed that the use of zinc insures sharpness of melting point, in addition to natural fluidity, has much to do with successful production in quantity of this casting over a period of years.

**14-364. Design Rules—VIII.** Herbert Chase. *Die Casting*, v. 2, Oct. '44, pp. 47-52.

Specify on drawing where machining is to be done; allow sufficient draft and indicate it on drawings; ejector pin marks should be indicated on the drawing if possible; many fastening devices can be integrally cast.

**14-365. Alloys for Die Casting Lead.** *Die Casting*, v. 2, Oct. '44, pp. 53-56.

Lead die castings find considerable use for certain specialized applications, particularly where corrosion resistance or high density is needed.

**14-366. Oxidation Inhibitors in Core-sand Mixtures for Magnesium Castings.** O. Jay Myers. American Institute of Mining & Metallurgical Engineers, Technical Publication No. 1776, 9 pp.

Protective agents; experiments with mixtures.

**14-367. Casting to Facilitate Machining.** T. Roberts. *Machinery (London)*, v. 65, Sept. 7, '44, p. 270.

How much to allow for subsequent removal in the machine shop is a question often asked by the pattern maker when setting out new work.

## 15. SECONDARY METALS

**15-28. Aluminum Scrap and Secondary Metal.** Alexander Korn. *Chemical Age*, v. 51, Sept. 2, '44, pp. 233-234.

Output of secondary ingot; post-war market; need for research.

**15-29. Routine Inspection and Salvage of Machinery Weldments.** James W. Owens. *Welding Journal*, v. 23, Oct. '44, pp. 891-905.

A contrast of design, inspection and salvage requirements and procedures; inspection techniques and procedures; salvage techniques and procedures.

## 16. FURNACES AND FUELS

**16-126. Arc Furnaces.** C. C. Levy. *Iron & Steel*, v. 17, August '44, pp. 572-575, 580.

Power supply developments, past and future.

**16-127. New Studies of Melting and Casting Conditions for Chromium-Nickel-Molybdenum and Chromium-Molybdenum Steels in Basic Electric and Basic Open-Hearth Furnaces.** Wolfram Ruff. *Stahl und Eisen*, v. 63, '43, pp. 438-442. *Alloy Metals Review*, v. 3, March '44, p. 1.

Commercial operations with a 20-ton electric furnace and an open-hearth furnace of similar capacity are compared on the basis of approximately 400 melts during a 7-month period. Steels contained Cr 1.4, Ni 2.7 and Mo 0.25% and Cr 2, Ni 0.3 and Mo 0.25%. Spoon, ladle and pouring temperature of the electric Cr-Ni-Mo steels were 5 to 10°F. lower than those of the electric Cr-Mo steels and slightly higher than the Cr-Ni-Mo open-hearth steel. Yield strength, tensile strength and elongation of electric and open-hearth steels were approximately equal, but the former steels had definitely superior reduction of area and impact strength.

**16-128. Monometer Tilting and Rotary Furnaces for Metal Melting.** *Engineering*, v. 158, August 25, '44, p. 146.

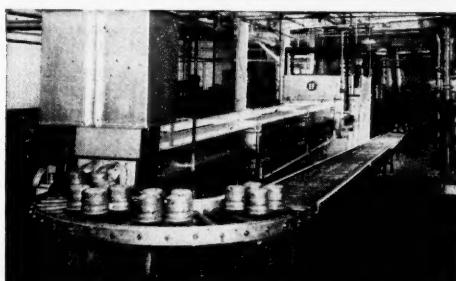
Description of types of tilting and rotary metal-melting furnaces.

**16-129. Factors Influencing the Moisture Content of Furnace Atmospheres.** F. Gilbert and E. Scheuer. *Metallurgia*, v. 30, August '44, pp. 187-190.

Number of sources from which this moisture content may be derived, but the authors direct particular attention to the hydrogen and water content of the fuel and air used for combustion. Graphs have been prepared which give quickly, and with reasonable approximation, the water content of the combustion gases, if the water and hydrogen content of fuel and combustion air are known.

**16-130. Fires Forging and Heat Treating Furnaces With Pulverized Coal.** R. A. Campbell and J. H. Loux. *Steel*, v. 115, Oct. 2, '44, pp. 90-92, 94.

Circulating load of about 60% of pulverized capacity is carried constantly in distributing line thus affording an interrupted supply of coal at burners. Each burner can be adjusted without affecting feed to other burners. Zone temperatures of heat treating furnaces controlled automatically to give uniform annealing and drawing operations.



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## Deep Freezing High Speed A Controversial Procedure Grimshaw Tells York

Reported by Don Sener

Assistant to Special Representative, Harrisburg Steel Corp.

York Chapter opened its sixteenth year with a presentation by Leonard C. Grimshaw of the Latrobe Electric Steel Co. of the "Selection and Heat Treatment of Tool and Die Steel."

Mr. Grimshaw's discussion of cutting, shearing and forming tools has been reviewed on previous occasions, but he also devoted some time to explaining the effect of deep freezing on hardened high speed steel.

High speed hardening temperatures produce a steel largely in the austenitic state, and it transforms to martensite very sluggishly. At 400° the transformation begins and approximately 60% austenite has changed to martensite at 200°. Room temperatures find the steel with about 10% retained austenite which, if drawn at 1050° F., transforms to martensite only on cooling again to room temperature. This martensite is untempered and brittle. If the steel is cooled to -120° F. when quenching, it transforms 100% from austenite to martensite, and the 1050° F. draw tempers all the martensite.

This is the theory, roughly, and although it can do no harm to treat steel this way, authorities, as a whole, are not ready as yet to say that the same results cannot be accomplished by a double draw at 1050° F. The point in the hardening procedure to introduce the freezing is highly controversial. Various authorities have championed before drawing, others after drawing; some have advocated immediately after hardening, and others desire a period of elapsed time before the arctic treatment.

R. P. Kells, chief service engineer of the Latrobe Co., then took the floor and answered questions.

## Beryllium-Copper Post-War Applications Outlined

Reported by W. W. Dyrkacz  
Works Laboratory, General Electric Co.

"Beryllium-Copper in Post-War Designing" was the title of some interesting data presented by Messrs. R. W. Carson, vice-president, H. B. Williams, chief metallurgist, and L. Jacobi, field engineer, of the Instrument Specialties Co., Inc., Little Falls, N. J. at the Sept. meeting of the Schenectady Chapter of A.S.M.

Mr. Williams dealt with the metallurgy of beryllium-copper, discussing the effect of chemical composition, amount of hot working, and various heat treatments on the physical properties, and correlating the results with microstructure. Graphs illustrated the effect of heat treatment on hardness, modulus of elasticity, electrical conductivity, and "drift" or creep.

It was stated that the proper balance of these properties, and *not* maximum hardness, is necessary in the manufacture of satisfactory parts for spring applications. In addition, the effect on the physical properties of cold working prior to the aging treatment was discussed.

Mr. Carson pointed out that beryllium-copper approaches the ideal material for springs because of its combination of exceptional strength, corrosion resistance, and high endurance limit. The "Micro-Processing" technique for heat treating various beryllium-copper parts was described, particularly with reference to the production of the perfect spring. Present and post-war applications of beryllium-copper in the form of springs, forgings, castings, and bushings were outlined.

The talks were supplemented with numerous slides and samples presented by Mr. Jacobi.

## Van Horn Gives Talk at Montreal

Reported by J. Royer  
Welding & Supplies Co. Ltd.

Montreal Chapter opened its 1944-45 season with National Officers' Night, the guest and speaker of the evening being National President Kent R. Van Horn.

In the absence of Secretary Bill Eisenman, who had been unavoidably detained in Cleveland, Dr. Van Horn supplied the entertainment of the evening during the coffee talk with a few of Mr. Eisenman's favorite stories. The subject of Dr. Van Horn's technical discussion was "The Age Hardening of Metals". His talk will be presented before many other A.S.M. chapters during the course of the winter.

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## CHAPTER MEETING CALENDAR

CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Boston	Dec. 1	Hotel Sheraton	James V. Baxter	Practical Plant Metallurgical Control
British Columbia	Nov. 27	Brock Memorial Bldg., Vancouver	H. B. Osborn Jr.	Induction Heating: At War Today—At Peace Tomorrow
Buffalo	Dec. 14	Hotel Statler	K. R. Van Horn	Metallurgy of Aluminum Alloys
Calumet	Dec. 12	Phil Schmidt's, Roby, Ind.	C. C. Wagner	Unfinished Rainbows (Motion Picture)
Canton-Massillon	Dec. 14	Elks Club	J. J. Nassau	The Universe of Galaxies
Chicago	Dec. 14	Chicago Bar Association	A. Allan Bates	Engineering Materials of the Future
Cincinnati	Dec. 14	Engineering Society	Gilbert Soler	Production of Electric Furnace Steel
Cleveland	Dec. 4	Cleveland Club	John Mitchell	Hardenability Bands
Columbus	Dec. 12	Fort Hayes Hotel	R. F. Miller	National Officers' Night
Dayton	Dec. 13	Engineers Club	J. O. Almen	Christmas Party
Detroit	Dec. 11	Chamber of Commerce	E. O. Dixon	Metal Testing
Ft. Wayne	Nov. 28	Chamber of Commerce	J. O. Almen	Forgings
Ft. Wayne	Dec. 26	Chamber of Commerce	J. O. Almen	Christmas Party
Georgia	Dec. 4	Atlantic Steel Co.	J. O. Almen	Effect of Residual Stresses on Strength of Metals
Hartford	Dec. 12	Y. W. C. A.		Christmas Party
Indianapolis	Dec. 18	Y. W. C. A.		X-Rays in Industry
Kansas City	Dec. 27	.....		Christmas Party
Lehigh Valley	Dec. 4	Hotel Bethlehem	R. D. Stout	Ductility in Weldments
Louisville	Nov. 25	Kentucky Hotel	D. T. Wellman	Magnesium Alloys
Mahoning Valley	Dec. 12	Y. M. C. A.	C. M. Lichy	The Manufacture of Bessemer Steels
Manitoba	Dec. 14	Mariborough Hotel, Winnipeg	P. Blackwood	Centrifugal Casting
Milwaukee	Dec. 19	Athletic Club	John R. Green	Fundamental Principles in the Measurement and Control of Heat Treating Temperatures
Montreal	Dec. 4	Queen's Hotel	E. Dale Trout	X-Rays in Industry
New Haven	Nov. 27	Hammond Laboratory, Yale University	Walter D. France	Effect of Alloying Elements on Copper Base Alloys
New Haven	Dec. 15	Hotel Clark, Derby, Conn.		Christmas Party
New Jersey	Dec. 18	Essex House, Newark		Annual Smoker
New York	Dec. 11	2 Park Ave., 26th Floor	Kent R. Van Horn	Metallurgy of Aluminum Alloys
North West	Dec. 12	University of Minnesota		To be announced
Notre Dame	Dec. 13	Engineering Auditorium, University of Notre Dame	F. G. Tatnall	Physical Testing, Present and Future
Ontario	Dec. 1	Leonard Hotel, St. Catharines	J. O. Almen	Fatigue in Relation to Design
Oregon	Dec. 15	.....		Christmas Party
Philadelphia	Dec. 15	.....		Christmas Party
Pittsburgh	Dec. 14	Roosevelt Hotel	Alex Finlayson	Modern Foundry Practices
Puget Sound	Dec. 20	Washington Athletic Club	Paul L. Butler, Wm. Matthew and A. M. Setapen	Symposium on New Metallurgical Developments
Rhode Island	Dec. 6	.....		
Rochester	Dec. 11	Lower Strong Auditorium, University of Rochester	L. E. Gibbs	Deep Drawing of Brasses
Rockford	Dec. 13	Faust Hotel	H. B. Osborn, Jr.	Induction Heating
Rocky Mountain	Dec. 15	Oxford Hotel, Denver	P. E. Cavanaugh	Electronic Inspection of Metals
Schenectady	Dec. 12	Jack's Oyster House	K. R. Van Horn	X-Rays in Industry
Syracuse	Dec. 5	.....	V. N. Krivobok	Aircraft Metallurgy
Toledo Group	Dec. 12	Hotel Ft. Armstrong, Rock Island, Ill.	James P. Gill	Christmas Party
Tri-City	Dec. 14	IOOF Hall	Norman Goss	Recent Development and New Procedure of Handling Carbon Tool Steels
Warren	Dec. 13	P. E. P. Co. Auditorium	N. L. Mochel	Continuous Casting of Steel
Washington	Dec. 18	Rowe Hotel, Grand Rapids	J. C. Fox	Weldments vs. Castings vs. Forgings
West Michigan	Dec. 13	Hotel Sheraton	Peter Payson	Die Castings
Worcester	Dec. 13	West York Inn, York, Pa.	Edward Engel	Anodizing and Dye Coloring of Aluminum

## New Positions—New Duties



S. H. Graf      A. F. Sprankle      E. A. Carlier

Announcement has been made of the advancement of Prof. S. H. Graf, past chairman of the Oregon Chapter A.S.M. to the position of director of the Engineering Experiment Station at Oregon State College. Professor Graf has for many years served as director of engineering research and his new appointment places him in administrative charge of the Station. He will also continue as head of the Department of Mechanical Engineering for the present.

A. F. Sprankle has been appointed metallurgical engineer in the Timken Steel and Tube Division of Timken Roller Bearing Co. He was formerly manager of the Alloy Bureau of Carnegie-Illinois Steel Corp. in the Pittsburgh District. A graduate of Ohio State University, Sprankle was formerly with Timken between 1933 and 1937.

E. A. Carlier, a charter member of the Warren Chapter A.S.M., and formerly plant engineer of the Tank Division of Federal Machine & Welder Co., has accepted the position of general superintendent of the U. S. Manufacturing Corp., Decatur, Ill.

## Radium & X-Ray Society Elects Officers

Roy W. Emerson, Pittsburgh Pipe & Equipment Co., was elected president of the American Industrial Radium and X-Ray Society, Inc. at its fourth annual meeting held during the National Metal Congress.

Other officers elected were Kent R. Van Horn, Aluminum Co. of America, vice-president, and Alvin F. Cota, A. O. Smith Corp., treasurer. Newly elected directors are Leslie W. Ball, Triplet & Barton Co., and Don M. McCutcheon, Ford Motor Co., Phillip D. Johnson, Radium Chemical Co., Chicago, continues as secretary of the group.

## CALENDAR OF OTHER MEETINGS

Nov. 27-Dec. 1—American Society of Mechanical Engineers. Annual Meeting, Hotel Pennsylvania, New York City. (Clarence E. Davies, Secretary, 29 West 39th St., New York 18, N. Y.)

Nov. 27-Dec. 2—Sixteenth National Exposition of Power and Mechanical Engineering, Madison Square Garden, New York City. (Charles F. Roth, President, International Exposition Co., 480 Lexington Ave., New York 17, N. Y.)

Nov. 29-Dec. 1—American Society for Testing Materials and Institute of Metals Division, American Institute of Mining and Metallurgical Engineers. Joint Symposium on Stress Corrosion Cracking, Hotel Benjamin Franklin, Philadelphia. (Carter S. Cole, A.S.T.M., 260 South Broad St., Philadelphia 2, Pa.; E. A. Anderson, A.I.M.E., 29 West 39th St., New York 18, N. Y.)

Dec. 6-8—National Association of Manufacturers. Reconversion Congress of American Industry, Waldorf-Astoria Hotel, New York City.

## Glenn Carter New President of I.A.A.

Glenn O. Carter, consulting engineer of The Linde Air Products Co., was elected president of the International Acetylene Association at the 44th annual meeting, held in Cleveland, Oct. 18. R. B. Swope, president of the Southern Oxygen Co., was elected vice-president, and Philip Kearny and H. F. Reinhard, both of New York, were re-elected treasurer and secretary, respectively.

New Directors are Ellsworth L. Mills, Bastian-Blessing Co.; P. E. Engler, the Balbach Co.; and C. McL. Pitts, The Peoples Gas Supply Co., Ottawa, Canada.

## Walsh-Kaiser Shipyard Inspected

Reported by Joseph M. Redinger, Jr.  
General Manager, Thurston Mfg. Co.

A tour of inspection through all departments of the Walsh-Kaiser Shipbuilding Co., Inc. in Providence was provided on Oct. 4 for approximately 125 members and friends of the Rhode Island Chapter, A.S.M.

The practice of this yard is to prefabricate as many parts of the ships as possible before final assembly. Walsh-Kaiser is manufacturing combat transport ships, and the inspection of an almost completed ship was undoubtedly the highlight of the afternoon.

The Chapter invited J. S. MacDonald, general manager of the yard, to speak at the evening session, and he dealt with the production problems that had to be overcome in the manufacture of ships.

## Silver Brazing Depends On Good Joint Design And Close Tolerances

Reported by Charles Nagler

Instructor of Metallography, University of Minnesota

M. C. Robbins, Chicago district manager for Handy & Harman, discussed "Silver Brazing" at the September meeting of the North West Chapter. "Easy Flo" and "Sil-Fos," trade-named products of Handy & Harman, are used to join two metals at relatively low temperatures. "Easy-Flo" is a silver brazing alloy of 50% silver with equal parts of copper, cadmium and zinc. It melts at 1160° F. and flows at 1175° F.

The whole success of silver brazing is dependent on good joint design. Fillets are not necessary.

Tolerance on a joint should be held between 0.0015 and 0.003 in.; above 0.006 in. there is a marked loss in strength. The strength of a silver soldered joint averages between 130,000 and 140,000 psi., generally above the strength of the metals joined.

Oxide and grease must be removed from the metal surface by cleaning with carbon tetrachloride or other degreaser.

Induction heating, resistance brazing, torch brazing, salt bath, and conveyor-type furnaces can be used for heat application. It is advantageous for maximum economy to employ pre-placed wire rings or washers of the solder rolled to the desired thickness. The rings must have the proper tension or compression so that they stay in place as the part is being heated to the brazing temperature. The size of pre-placed washers or rings may vary from  $\frac{1}{4}$  in. diameter up to 48 in.

Sil-Fos, which is used for brazing copper and brass only, is made up of 80 parts copper, 15 parts silver, and 5 parts phosphorus, the latter serving both as a scavenger and as a flux. A flux is essential in brazing copper to brass but not copper to copper.

In many applications parts can be brazed and heated to the hardening temperature in one operation. Then the part can be quenched and tempered to produce the desired set of physical properties.

One important point in silver brazing is that the melting point of the flux should be 50° F. below that of the solder. Borax is none too good for it melts at 1300° F. and many of the silver brazing alloys are fluid at a lower temperature. The fluxes generally contain mixtures of potassium fluoride and borate and water.

## Generators for High Frequency Current Compared as to Efficiency and Cost

Reported by T. E. Hamilton  
Metallurgist, Delco Products Division

The October meeting of the Dayton Chapter featured a talk on "High Frequency and Flame Hardening" by F. G. daRoza of the development laboratory of the Weldpower Division of Raytheon Mfg. Co., Waltham, Mass.

Mr. daRoza discussed the generation of high frequency currents by the use of motor generators, spark gap oscillators and vacuum tube oscillators, comparing these units as to type of application, power output, efficiency and cost. He compared induction hardening with flame hardening and pointed out that flame hardening should be considered in any new case hardening application.

## "Powder Metallurgy" and "Inspection" Subjects of Two Lecture Courses

"Powder Metallurgy" is the subject of the current educational lecture course being sponsored by the New York Chapter A.S.M. Methods of production were discussed on Oct. 30 and equipment on Nov. 6. Applications will be covered on Nov. 20 by E. W. Engle, and on Nov. 27 by Gregory Comstock and W. J. Hayman.

The spring lecture course of the New York Chapter will be on "Inspection and Testing of Metals and Alloys". General, visual, mechanical and spark methods will be covered on April 2 by H. Hanink and H. B. Pulsifer; metallographic, spectrographic, and electron microscope methods on April 16 by C. S. Barrett and C. C. Nitchie; X-ray, radiographic and gamma ray methods on April 23 by Noah Kahn and H. E. Seeman; and non-destructive methods on April 30 by D. S. Miller.

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## Creep Occurs in Three Stages, Affected by Grain Structure

Reported by W. T. Rubin  
Metallurgist, Copperweld Steel Co.

In a lecture on "Properties of Metals at Elevated Temperatures" R. F. Miller, development engineer for the Carnegie-Illinois Steel Corp., told the members of the Warren Chapter on Oct. 12 that creep takes place in three stages. The first stage is initial straining at a decreasing rate, the second stage occurs either at a constant rate or in asymptotic approach to a constant rate, and the third stage is marked by an accelerating creep rate.

Coarse grain structure, whether effected by heat treatment or by recrystallization after cold working, decreases the creep rate of steel above 800° F. Carbon above 0.20% has little effect on creep resistance, shows a slight increase up to 500° F., and then a drop above this temperature. Chromium also has little effect on creep up to about 2%, and lowers resistance above this percentage. Molybdenum is adjudged to be the most powerful element in increasing creep strength.

Those structures such as martensite which change at elevated temperatures decrease creep resistance. Hence, steels which are to be used for high temperature application should, if possible, be treated so that very little or no structural changes take place at the elevated temperature.

In conclusion, the speaker gave examples of many new and startling developments in metals for high temperature applications, some of which are now restricted but which will be released at the conclusion of hostilities.

## Seasholtz Discusses Salt Baths



"Guess work in heat treating is a thing of the past if modern equipment and scientific data are used," said A. P. Seasholtz, metallurgical engineer of E. F. Houghton & Co., in his talk on "Salt Bath Heat Treatment" before the West Michigan Chapter. An article by Mr. Seasholtz in the October issue of Metal Progress covered substantially the subject of his lecture. Mr. Seasholtz is shown at left above being congratulated by Chapter Chairman C. H. Lloyd, also of E. F. Houghton & Co. (Reported by Roy B. Nelson, Nelson Machine Tool Co.)

## Diamond Wheels Recommended For Grinding Tungsten Carbide Tools

Reported by H. H. Hewitt, Jr.  
Steel Tank and Pipe Co. of Oregon

A new technicolor talking picture on "The Grinding of Carbide Tools" was shown for the first time on the Pacific Coast at the Sept. 8th meeting of the Oregon Chapter by John Strachan, Jr., northwest grinding engineer for the Norton Co. Mr. Strachan gave a brief history of the development of wheels for grinding tungsten carbide tools.

An interesting discussion followed the picture on how the lapping type of super-finish compares with the straight grind on a 500-grit diamond wheel. Mr. Strachan seemed to feel that the latter would stand up better in service. There was also a discussion of diamond wheels in general and of boron carbide and its uses.

## Bowman Directs Carborundum Public Relations

The Carborundum Co., Niagara Falls, N. Y., announces the appointment of Francis D. Bowman as director of public relations. For many years Mr. Bowman has held the title of advertising manager of the company. The advertising department of the Carborundum Co. has been consolidated with the merchandising department and all industrial advertising will be in charge of M. S. Ireys, director of merchandising, with Mr. Bowman continuing to direct the company's advertising in national mediums.

## Buffalo Members Attend A.S.T.E.

Reported by George F. Kappelt  
Metallurgist, Bell Aircraft Corp.

Ten members of the Buffalo Chapter of the American Society for Metals attended the September dinner and meeting of the American Society for Tool Engineers. Among those present to hear James P. Gill, past national president of A.S.M., talk on "High Speed Steels" were G. B. Michie, chairman; J. H. Birdsong, secretary; and E. A. Gietzen, treasurer of the Buffalo Chapter.

The annual golf party of the Buffalo Chapter was held at the Lancaster Country Club on Sept. 9. Seven golf prizes including two loving cups, as well as 13 door prizes, were awarded.

## 1945 Foundry Congress to Be in Detroit

Announcement has been made by the American Foundrymen's Association that the 1945 Foundry Congress, the 49th annual meeting of the Association, will be held in Detroit the week of April 30 through May 4. The event is announced as the 4th War Production Foundry Congress and the program is being planned to stress the necessity of continued high production by the foundry industry even though "V-E Day" may precede the event itself.

No exhibit is planned in connection with the 1945 meeting in Detroit, in view of the fact that the equipment and supply industry is expected to concentrate on plans for the 50th Anniversary Foundry Congress and Foundry Show of the Association to be held in 1946.

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## A.S.M. Review of Current Metal Literature — Continued

### 18. HEAT TREATMENT (cont.)

18-206. An Investigation on the Effects of Varying Precipitation Conditions in Magnesium-Aluminum Alloys of Elektron AZ91 Type. E. Lardner. *Magnesium Review*, v. 4, April '44, pp. 51-58.

For Elektron AZ91 type alloys alternate methods of precipitation treatment other than by reheating the supersaturated solid solution possess no advantages, either in respect of improved mechanical properties or of reduced heat treatment times. 1 ref.

18-207. Continuous Hardening of Steel Bars by Induction. *Steel Processing*, v. 30, Sept. '44, pp. 574-575.

Tocco equipment now being used for this application by the Caterpillar Tractor Co.

18-208. Continuous High Frequency Heat Treatment. *Steel Processing*, v. 30, Sept. '44, pp. 578-579.

Application to finished bearing pins, each 2 1/2 in. long by 1/2 in. diameter, case hardened to a depth of 0.025 in. as they were fed automatically through a glass tube and water quenched as they left the heating coil at the rate of 75 bearing pins per minute.

18-209. Heat Treating Controls Productivity of Band Files. H. J. Chamberland. *Steel Processing*, v. 30, Sept. '44, pp. 581-583.

Absolute control over every phase of heat treating is the secret of file band performance.

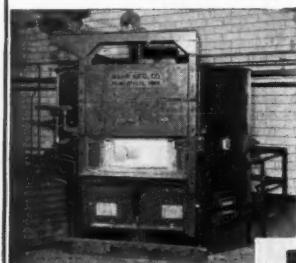
18-210. Control of Heat Treatment. A. H. Koch. *Steel Processing*, v. 30, Sept. '44, pp. 584-590.

Surface protection in the furnace chamber, controlled cooling and control of quench.

18-211. Nitriding Ferroalloys. II. Ralph H. Steinberg and Dave Steinberg. *Metals & Alloys*, v. 20, Sept. '44, p. 630.

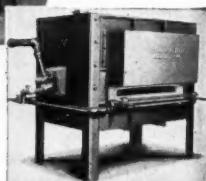
Results of nitriding the more or less well-known ferro-alloys used in steel making, along with the nitriding of scale or ferrous oxide.

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18-212. Sub-Zero Treatment to Improve Tool Life. Stewart M. DePoy. *Metals & Alloys*, v. 20, Sept. '44, pp. 645-649.

Extraordinary life extensions or productivity increases enjoyed by steel tools subjected to refrigeration at selected sub-zero temperatures during the hardening cycle. Use of sub-zero treatment for strain relief.

18-213. Heat Treating Sheets. *Steel*, v. 115, Oct. 2, '44, p. 104.

A salt bath heat treating furnace for handling aluminum sheets affords advantages in automatic operation and temperature control.

18-214. Facilities for Water Quenching Steel Castings. R. H. Swartz. *Foundry*, v. 72, Oct. '44, pp. 82-84, 230, 232, 234, 236.

Furnace equipment and quench facilities that are required for effective water quenching of steel castings.

18-215. An Unusual Heat Treat and Stress Relief Application. Gerald Eldridge Stedman. *Industrial Gas*, v. 23, Oct. '44, pp. 19-21, 48.

The design of the gas-fired heat treat and stress relief furnace.

18-216. Continuous Hardening of Engine Parts. Willard Roth. *Steel Processing*, v. 30, Oct. '44, pp. 663-666.

Hardening and quenching of engine parts in continuous and automatic type furnaces using protective atmospheres.

18-217. Furnaces for Heat Treating Aircraft Parts of Aluminum Alloy. Cecil J. Mayo. *Metal Progress*, v. 46, Oct. '44, pp. 693-698.

Elevator type furnaces, with electrically heated and recirculated atmospheres, developed many troubles from sagging doors and faulty hoisting devices. They were rebuilt with a positive-action plunger hoist which carries the load at all times and whose motion is adequately interlocked with the door-opening mechanism. Problems now have principally to do with construction of work racks and provision of furnaces with high headroom, so long pieces or sheets can be heat treated while hanging end-wise.

18-218. "Interrupted" Quenching in Salt Baths. Arnold P. Seasholtz. *Metal Progress*, v. 46, Oct. '44, pp. 730-738.

High temperature soak; effects of quenching media; austempering; isothermal quenching.

18-219. Double Temper Mo-W High Speed at Slow Heating Rate. K. J. Trigger. *Metal Progress*, v. 46, Oct. '44, pp. 743-745.

The effect of the heating rate in tempering. The effectiveness of a double temper on the transverse strength of small test beams.

18-220. Heat Treating 5-in. Navy Shells. *Iron Age*, v. 154, Oct. 5, '44, pp. 64-85.

Conveyor type heat treating equipment. Special furnaces and machinery for the handling of shells.

18-221. Annealing. *Automobile Engineer*, v. 34, Sept. '44, p. 371.

The effect of annealing temperature and period on the softening of previously cold worked metal.

18-222. The Effect of Time and Temperature on the Relief of Residual Stresses in Low-Alloy Steels. J. K. McDowell and Paul C. Cunnick. *Welding Journal*, v. 23, Oct. '44, pp. 481-s-486-s.

The degree of stress relief obtained is affected more by temperature than time at temperature. With few exceptions, a heat treatment of 1 hr. at a given temperature provides an equal or greater amount of stress relief than 8 hr. at a temperature 100° F. lower.

18-223. Extending Cutting Tool Life by Refrigeration and Nitriding. C. S. Lucas and H. M. Hartley. *Iron Age*, v. 154, Oct. 12, '44, pp. 74-77, 168.

Sub-zero refrigeration is being used as a means of reclaiming multipoint high speed steel tools that are too soft in the "as received" condition. Salt bath nitriding is also being applied in the tool crib as a means of obtaining additional production yield on taps, chasers and milling cutters. Cutting edge finish and tool life are improved by regrinding and honing.

18-224. Armor Plate Developments. *Steel*, v. 115, Oct. 16, '44, p. 106.

Die quenching of heat treated homogeneous armor plate has been developed by Ford Motor Co. engineers to facilitate the straightening of plate after heating and prior to drawing.

18-225. Controlling the Temperature of Quenching Oil. *Metal Progress*, v. 46, Oct. '44, pp. 713-714.

Methods of heating and cooling oil.

18-226. Sub-Zero Treatment of Steel, a New Departure in Shop Practice. H. C. Amsberg. *Machinery*, v. 51, Oct. '44, pp. 137-144.

Changes that take place in steel when subjected to very low temperatures following the usual heat treatment open up an entirely new field in the treatment of cutting tools and tool steels in general. 11 ref.

18-227. Surface Heating by Induction. Herbert F. Storm. *Electrical Engineering*, v. 63, Oct. '44, pp. 749-754.

Induction heating offers a method for heating of electrical conductors such as steel, brass, graphite, by exposing them to a varying magnetic field. 2 ref.

18-228. Induction Heating—Selection of Frequency. N. R. Stansel. *Electrical Engineering*, v. 63, Oct. '44, pp. 755-759.

Relation of frequency and kilovolt-ampere capacity as the basis for the selection of the frequency for a given heating service. 6 ref.

18-229. Skin Recovery for Decarburized Steel Surfaces. Orville E. Cullen. *Metals and Alloys*, v. 20, Oct. '44, pp. 954-958.

Heat treatment in a simple controlled atmosphere process based on the principle of carbon pressure balance, and how it is being applied today to the re-carburizing of various engineering steels.

18-230. Salt Bath Quenching Processes. Harold J. Cock. *Metals and Alloys*, v. 20, Oct. '44, pp. 964-972.

Describes the practical processes (martempering, austempering and cycle annealing) and cites applications of salt bath quenches to the improved heat treatment of various war products. 8 ref.

18-231. Quenching Furnace Suitable for Small Specimens. E. A. Owen. *Journal of Scientific Instruments*, v. 21, no. 4, April '44, pp. 65-66.

*Engineers' Digest*, v. 1, Sept. '44, pp. 579-580.

Furnace designed especially for use with small specimens in lump or in powder form.

18-232. Sub-Zero Treatment of Steels. H. C. Amsberg. *Steel*, v. 115, Oct. 23, '44, pp. 78, 80, 82.

Value of process unquestioned and it is likely to become routine part of normal heat treating practices; fundamentals involved in hardening steels at low temperatures.

18-233. A Study of Sub-Zero Treatments Applied to Molybdenum-Tungsten High Speed Steel. Ralph G. Kennedy, Jr. *American Society for Metals 1944 Preprint* no. 28, 44 pp.

Effect on physical properties of such factors as the sub-zero temperature reached, the time of holding at this temperature and the time of aging at room temperature before sub-zero cooling. The effect of sub-zero cooling before and after tempering has been examined in conjunction with the usual heat treatment variables of hardening temperature, tempering temperature, and quenching temperature attained before tempering. 26 ref.

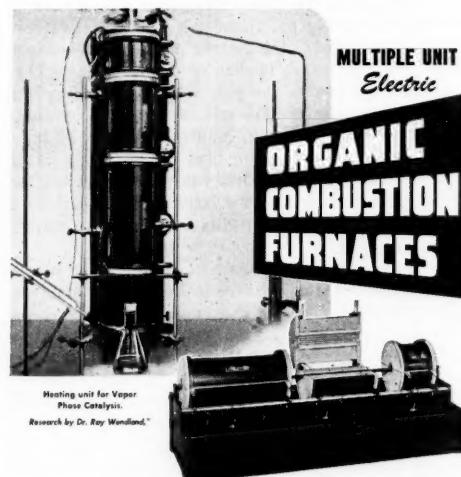
### 19. WORKING

Rolling, Drawing, Pressing, Forging

19-268. Mill Design. A. E. Lendl. *Iron & Steel*, v. 17, August '44, pp. 560-563.

Need for research to avoid costly "trial and error" methods. Pressure calculation; influence of temperature and roll diameter; influence of initial width and degree of reduction; prevented spread.

(Continued on Page 15)



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# A.S.M. Review of Current Metal Literature—Continued

## 19. WORKING (cont.)

**19-269. The Drawing of Wire from High Speed Steel R.F.I.** V. Nagorni. *Novosti Tekhniki*, v. 9, no. 11-12, '40, pp. 24-25; *Chem. Zentr.* I, '41, pp. 2852-2853. *Alloy Metals Review*, v. 3, March '44.

The waste in the manufacture of cutting tools only 1.5 to 5 mm. in diameter from 6 to 6.5 mm. steel ingots can be reduced from 90 to 10% by cold drawing the ingot. The ingots were heated to 875° over a period of 9 hr., held at this temperature for 6 hr., cooled to 875° over a period of 4 hr., heated to 700° in 1 hr., held at this temperature for 5 hr., and cooled to room temperature in another 5 hr. R.F.I. high speed steel containing C 0.72 to 0.79, Mn 0.39 to 0.4, Si 0.38 to 0.4, Cr 3.9 to 4.3, Ni 0.2, W 17.9 to 18.4, V 1.2 to 1.3, P 0.029 to 0.03 and S 0.028 to 0.029% when so treated showed a tensile strength of 106.5 to 108 kg./sq. mm. and extension of 11.5 to 12.4% and a Brinell hardness of 95 to 98. The ingot was then pickled for 40 min. in 8 to 12% H<sub>2</sub>SO<sub>4</sub> at 45 to 80°, dried 20 min. at 90 to 100° and drawn at a rate of 12 per min. Powdered graphite with or without 30% talc was found to be the most satisfactory lubricant for this process. After every second drawing process the metal was heated to 680 to 690° for 75 min. in a bath containing NaCl 40, KCl 40, and Na<sub>2</sub>CO<sub>3</sub> 20% or NaCl 50, K<sub>2</sub>CO<sub>3</sub> 25 and Na<sub>2</sub>CO<sub>3</sub> 25%, then cooled in air, plunged into water at 90 to 100° and again pickled as above for 10 min. After drawing, the wire showed a tensile strength of 100 to 105 kg./sq. mm., an extension of 3 to 6.5% and a hardness of 27 to 28. After annealing, the corresponding values were 77 to 80 kg./sq. mm., 10.4 to 11.7% and 17 to 18.5 units. Steel wire pickled in bundles showed a surface corrosion.

**19-270. Krause Reciprocating Mill Used in Brass Rolling.** *Iron Age*, v. 154, Sept. 28, '44, pp. 60-63.

Unique rolling mill with a reciprocating roll assembly is being successfully employed for heavy reductions on wide brass strip. Indications are that it also may find application in the reduction of steel strip requiring particular physical characteristics.

**19-271. Induction Heating for Forging Shells.** *Metals & Alloys*, v. 20, Sept. '44, pp. 631-635.

Plant visit in pictures.

**19-272. Stretch-Pressing.** *Aircraft Production*, v. 6, Sept. '44, pp. 447-451.

Notes on developments in the United States.

**19-273. The Selection of Steels Used in the Rolled or Drawn Condition.** I. John H. Frye. *Metal Progress*, v. 46, Oct. '44, pp. 705-712.

Factors that underlie the intelligent selection of any steel for a given duty, emphasizing that it also requires the cooperation of designer, production man, metallurgist, and purchasing agent.

**19-274. Common Sense Approach to Forming Problems.** *Tool Engineer*, v. 14, Oct. '44, pp. 79-84.

Experience of progressive Eastern stamping company associated with automotive industry indicates that the modern approach to fabricating problems will include broader consideration of forming methods.

**19-275. Effect of Shape on the Formability of Deep-Drawn Sheet-Metal Parts.** W. A. Box and Wm. Schroeder. *Mechanical Engineering*, v. 66, Oct. '44, pp. 643-648, 662.

Experimentally determined results of the effect of size and shape on the limits for single-operation deep-drawn parts. The important elements that must be considered in determining the drawing limits are the over-all dimensions of the base of the part; the size of corner radii; the shape of the part; and the thickness of the material. Punch nose radii and draw radii must also be considered in order to obtain optimum results.

**19-276. High Speed Steel Forgings for Cutting Tools.** W. H. Wills. *Steel Processing*, v. 30, Oct. '44, pp. 656-657, 659.

Production and uses.

**19-277. Stampers to Make End-Products and Subassemblies.** *Steel Processing*, v. 30, Oct. '44, pp. 658-659.

In taking their place in post-war volume production, many job stampers will be prepared to offer their customers and prospective customers more than the production of a stamping made to the customer's specification. Operations such as assembling, brazing, welding, finishing, painting, plating and even porcelain enameling will be offered along with press work.

**19-278. Blanking and Forming Aircraft Parts at Boeing's Wichita Plant.** C. W. Hinman. *Steel Processing*, v. 30, Oct. '44, pp. 660-661, 678-680.

Boeing's in Wichita, Kansas, have developed some of the most interesting and useful time saving mass production methods used in the war.

**19-279. Aircraft Control Joints Reinforced by Swaging.** Thomas A. Dickinson. *American Machinist*, v. 88, Oct. 12, '44, p. 105.

A new method of swaging push-rod tubing around end fittings or terminals enables the tubing rod to handle comparatively heavy axial or torsional loads. This method makes it possible to indent, or swage, the tubing around a square, hexagon, knurled or otherwise roughened plug and greatly increases the strength of the engine and flying controls of large modern aircraft.

**19-280. Some Problems Influencing the Drawing of Fine Wire.** H. P. Edging. *Wire & Wire Products*, v. 19, Oct. '44, pp. 650-653, 739.

Products and applications; difficulties encountered; die problem.

**19-281. Tension and Velocity Controls: Applications of the Mechanical Variable Speed Transmission.** Joseph H. Gepfert. *Wire & Wire Products*, v. 19, Oct. '44, pp. 682-685, 688-691, 729.

Velocity and tension controls have become an extremely important part of daily life in the wire mill. These along with automatic controls are the basis of continuous production systems.

**19-282. Designing of "Trouble-Free" Dies.** C. W. Hinman. *Modern Industrial Press*, v. 6, Oct. '44, pp. 18, 20. Die for making 60 plier handles per min.

**19-283. Forming and Parting Dies.** James Walker. *Modern Industrial Press*, v. 6, Oct. '44, pp. 38, 40, 42. Construction, features.

**19-284. Combination Tool for Blanking and Drawing a Beaded Cup.** E. Barron. *Machinery* (London), v. 65, Sept. 21, '44, pp. 324-325.

A method of producing the pressed-metal cup by means of a combination tool.

**19-285. Recent Advances in Making Aluminum-Alloy Forgings.** L. W. Davis. *Machinery*, v. 51, Oct. '44, pp. 145-150.

Procedure in making the dies, selecting the alloy, and performing the forging and heat treating operations required to produce aluminum forgings of specified characteristics.

**19-286. The Use of Rubber in Conjunction With Press Tools.** *Machinery*, v. 51, Oct. '44, pp. 179-181.

Effective and economical methods of producing a wide range of sheet-metal parts—second of three articles.

**19-287. Head-Wrightson Light-Alloy Straightening Machines.** *Machinery* (London), v. 65, Sept. 7, '44, pp. 271-275.

On account of the wide diversity of aluminum-alloy sections now being called for, it is practically impossible to design roller-type equipment for the straightening operations, and stretching machines are now employed for this purpose.

## 20. MACHINING AND MACHINE TOOLS

**20-363. Drilling Structural Angles Simplified.** C. W. Hinman. *American Machinist*, v. 88, Sept. 28, '44, p. 95. Design and construction.

**20-364. Heavy Slotting Tools Devised for Turret Lathes.** E. Sperisen. *American Machinist*, v. 88, Sept. 28, '44, pp. 98-101.

Special tools permit the use of worn milling cutter blades in producing large torsional vibration dampeners for diesels.

**20-365. Special Tools Used to Cut Turbine Wheel Buckets.** Carl G. Preis. *American Machinist*, v. 88, Sept. 28, '44, pp. 102-104.

Hand filing among tasks which are eliminated by automatic machines developed by company.

**20-366. Taking Tools to Heavy Work by a Jib Crane.** J. I. Karash. *American Machinist*, v. 88, Sept. 28, '44, pp. 105-106.

Many parts to be machined in this plant were too heavy to handle by hand so a jib crane was designed whereby the spindle could be positioned to the work.

**20-367. Air Operated Jig for Bearing Shells.** I. F. Huey. *American Machinist*, v. 88, Sept. 28, '44, pp. 110-111.

Air cylinders clamp and locate bearing halves for drilling, and eliminate separate drill jigs.

**20-368. Grinding Problems Overcome by Revision of Shop Practices.** J. S. Steiner and S. H. Neady. *American Machinist*, v. 88, Sept. 28, '44, pp. 108-109.

Typical examples of processing steps adopted to eliminate difficulties in producing small lot pieces.

**20-369. Practical Ideas.** *American Machinist*, v. 88, Sept. 28, '44, pp. 115-120.

Adapting a shaper to cutting off tubing. Special adapter reclaims discarded grinding wheels. Novel die for securing motor laminations. Checking angles to minutes on a common protractor. Multiple stock dial indicates the progress of each lathe cut. Shear pin eliminates spindle fork breakage. An oil can that works uphill. Ramps and dollies ease labor in changing car wheels. Scriber on planer gage used for layouts. Adjustable stop adapter for use in lathe collets. Boring tools mounted in removable bars. Automatic feed of small parts reduces grinding time.

**20-370. Milling with Carbides.** *Western Metals*, v. 2, Sept. '44, pp. 44, 47.

Through the use of carbide-tipped cutters, superior finishes have been produced on steel and dural at speeds and feeds up to 1000% of conventional rates. Technique consists of: All-inclusive rigidity of the machine, cutter, arbor, fixture and part; careful selection of speed; heavy "chip load"; climb milling or plunge cutting; constant momentum.

**20-371. A Precision Tool: The Single Blade, Piloted, Expansion Reamer.** Albert W. Ehlers. *Tool and Die Journal*, v. 10, Sept. '44, pp. 107-109.

Method of employing the "Single Blade High Finish Piloted Expansion Reamer" in everyday production.

**20-372. Tool Room Surface Grinding—Part II.** J. E. Corbett. *Tool and Die Journal*, v. 10, Sept. '44, pp. 110-112.

Parallel surfaces; squares; grinding mutually square surfaces.

**20-373. Grinding Accurate Cam Surfaces.** Paul Stoner. *Machinery*, v. 51, Sept. '44, pp. 163-166.

Points to be considered in grinding intentionally out-of-round surfaces, such as cams, eccentrics, and elliptical or relieved pistons.

**20-374. Lapping Piston Rings.** H. S. Indge. *Steel*, v. 115, Sept. 25, '44, p. 98.

For radial aircraft engines; involves careful preparation of surface and use of retainer rings to close piston rings to shape they assume when assembled. Hypalon machines and bonded abrasive laps employed.

**20-375. High-Speed Milling.** *Automobile Engineer*, v. 34, August '44, pp. 329-330.

American developments in the machining of light alloys; spar milling; milling heads; stock removal; feeds; coolants in high speed milling more recent developments.

**20-376. Hyper-Milling.** *Automobile Engineer*, v. 34, August '44, pp. 335-337.

Feeds and speeds; examples to show the effect different conditions have on the power required at a tool. Examples given of actual production figures.

**20-377. The Production of the Wickman 5-Spindle Automatic.** *Machinery* (London), v. 65, August 10, '44, pp. 141-146.

Operations on the spindle drum and other parts.

**20-378. Securing Fine Surfaces by Grinding.** H. J. Wills. *Machinery* (London), v. 65, August 10, '44, pp. 149-152.

Application of dressing tools.

**20-379. Roll Grinder.** *Iron & Steel*, v. 17, August '44, pp. 570-571.

Traveling type wheelhead unit for straight and camber profiling.

**20-380. Electronically-Controlled Adjustable-Speed Motors.** B. T. Anderson. *Machinery* (London), v. 65, August 24, '44, pp. 197-205.

Special applications to lathes and milling machines.

**20-381. Securing Fine Surfaces by Grinding.** H. J. Wills and H. J. Ingram. *Machinery* (London), v. 65, August 24, '44, pp. 210-212.

For surface quality better than 5 to 10 $\mu$ -inches r.m.s., it is usually assumed that it is a job for honing or lapping. For the closest requirements, lapping is usually specified.

**20-382. Formulae for Machining V-Channels.** R. A. L. Machinery (London), v. 65, August 24, '44, pp. 213-214.

Calculating the position where the cut must be started and also the depth to which such a tool must be taken in order to produce the correct width.

**20-383. Plastic and Metal-Bonded Diamond Wheels.** J. B. H. Machinery (London), v. 65, August 24, '44, pp. 215-216.

Respective fields of application.

**20-384. Precision Work on Old Lathes Permitted by Attachment.** *Iron Age*, v. 154, Sept. 28, '44, pp. 63, 136.

Combination tool holder and follow rest designed to overcome the difficulty encountered in turning or threading long shafts of small diameter.

**20-385. Machining of Light Alloys with Diamond Tools.** *Light Metals*, v. 7, Sept. '44, pp. 430-436.

Advantages of diamond as a cutting material and referring in particular to the machining of aluminum alloy pistons. 29 ref.

**20-386. Special Equipment to Facilitate the Efficient Use of Diamond Tools.** G. Schlesinger and D. F. Galloway. *Machinery* (London), v. 65, August 31, '44, pp. 233-235.

Orientation of faceted diamond tools; adjustment of rake.

**20-387. Super-Milling Introduces Flywheels to Machine Tools.** Guy Hubbard. *Steel*, v. 115, Oct. 2, '44, pp. 109-110, 112.

Widespread adoption in connection with wartime tooling, of these hitherto unfamiliar elements, foretells their incorporation into basic designs of post-war milling machines and certain other machine tools.

**20-388. Vertical Assembly.** *Steel*, v. 115, Oct. 7, '44, pp. 70-71, 86, 88.

Method of constructing aircraft torpedoes achieves precise balance and alignment. Center-line theory—developed for this application—inspires creation of clever jigs and arbors, simplifies machining of fittings and castings; dominates assembly of sections on large lathe.

**20-389. Modern Machine Tools.** *Aircraft Production*, v. 6, Sept. '44, pp. 430-432.

Gear hobbing; gear shaving; lapping; screwing; stripping press.

**20-390. Spar-Boom Milling.** *Aircraft Production*, v. 6, Sept. '44, pp. 438-442.

The Wadkin LZ6 machine. Speed range for carbide cutting tools. Hydraulic copying equipment and full automatic machining cycle.

**20-391. Tool Control Practiced at the Puget Sound Navy Yard.** W. E. Ainsworth. *Mechanical Engineering*, v. 66, Oct. 14, pp. 631-637.

Centralized tool control has many advantages; reconditioning high-speed twist drills; tool-and-die making and repair; tool grinding; inventory; storage of tools in toolrooms; issuing tools; miscellaneous duties.

**20-392. Accurate Grinding Depends Upon Correct Location of Surfaces.** S. H. Neady. *American Machinist*, v. 88, Oct. 12, '44, pp. 110-112.

Difficulty in securing correct lateral dimensions or correct relationship on ground parts is frequently due to incorrect use of multiple locating points.

**20-393. High Production with Radial Drilling Machines.** Jerome S. Wilford. *Tool Engineer*, v. 14, Oct. '44, pp. 71-73.

West Coast shop speeds extensive drilling and boring operations with ingeniously designed jigs and fixtures. Skill requirement is low.

**20-394. Future of Carbide Milling on Special Machines.** Milton J. Steffes. *Tool Engineer*, v. 14, Oct. '44, pp. 85-86.

The advent of machinery with higher spindle speeds and high horsepower ratings has shown that carbide-tipped cutters can be used with as few as 20% of the number of teeth used in high-speed steel cutters.

**20-395. Tooling the Drill Press for Multiple Machining Operations.** *Tool Engineer*, v. 14, Oct. '44, pp. 87-89.

Driver bar, actuated by drill press spindle, carries tools which adapt machine to perform four operations—a typical turret lathe job.

**20-396. Line Piercing.** Wesley F. Cook. *Tool Engineer*, v. 14, Oct. '44, p. 99.

Designed to give the same results as line-drilling, this punch press setup permits a much higher output. Cost of a die and a well-supported slender punch are about the same as for a drill jig for the same job.

**20-397. Qualification Test Specimens.** R. V. Anderson. *Welding Engineer*, v. 29, Oct. '44, pp. 42-43.

Machining, flame cutting, hand grinding and abrasive cutting wheels.

**20-398. Undercuts in Place of Fillets Simplify Cylindrical Grinding.** S. H. Neady. *Product Engineering*, v. 15, Oct. 20, pp. 707-708.

Considerations dictated by stress and strength factors, grinding practice requirements and equipment available, which govern the design of sharp corners, reliefs and fillets at inside corners of shoulders on cylindrical parts. Design standards that observe the factors discussed will result in increased production and reduced shop costs.

**20-399. Tooling for High-Speed Machining of Magnesium Base Castings.** Chris Adamski and G. Austin Fanning. *Die Casting*, v. 2, Oct. '44, pp. 76-78, 80-81.

Type of tool designed for the high speed machining of thin-walled magnesium alloy die castings.

**20-400. New Super Speed Punch Press Employs New Operating Principle.** *Modern Industrial Press*, v. 6, Oct. '44, pp. 26, 28.

The horizontal bed or plate upon which the die is secured is horizontally reciprocated by an eccentric driving crank. The horizontal movement of the die is in the same plane and direction in which the work strip is fed. The press ram, upon which the punch holder with its punches are attached, is reciprocated vertically by the same crank movement that oscillates the die.

(Continued on Page 17)

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**CASE No. 1**

*Condition:* Grinder table had to be resurfaced frequently to maintain true grinding of tool angles.  
*Correction:* Kennametal inserts provide fine, flat surfaces that show no appreciable wear after many months' service.

**CASE No. 2**

*Condition:* Worn sliding surfaces of abrasives saw rest allowed shank steel to wobble, causing uneven cut-off.  
*Correction:* Inserts of Kennametal make smooth surfaces that outwear steel up to 100 times.

**CASE No. 3**

*Condition:* Steel parts of vice clamping mechanism badly galled by twisting action.  
*Correction:* Kennametal discs, at abutting points, minimize wear; permit jaw to be closed securely, opened readily, with less effort.

**CASE No. 4**

*Condition:* Wire cleaning basket of wire-to-steel leveling guides in less than one year.  
*Correction:* Kennametal inserts resist the abrasion... after months' service, are still in good shape.

**CASE No. 5**

*Condition:* Steel surfaces of band saw guides wore quickly, allowing saw to weave and cause uneven profiling.  
*Correction:* Inserts of wear-resistant Kennametal provide non-galling surfaces that guide the saw straight and true.

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**Induction Heating Intricacies Explained for Layman**

Reported by W. A. Silliman

Chief Metallurgist, Cleveland Tractor Co.

"Induction Heating—at War Today, at Peace Tomorrow" was the subject of the first meeting of the Cleveland Chapter's fall season, when H. B. Osborn, Jr., research and development engineer, Tocco Division, Ohio Crankshaft Co., gave a straight-forward presentation of a difficult subject in terms that the layman could understand.

Dr. Osborn pointed out that it is not necessary for a material to possess magnetic properties in order to be heated inductively. Any substance which will conduct electricity will respond to induction heating.

The first practical application of induction heating was to crankshaft bearings, in order to improve the load-carrying properties and increase the resistance to wear. Accurate power measurement and control of the power input, and the control of the time cycle to 0.1 sec., give better uniformity of product than is possible by flame hardening. In addition to improving the quality of the crankshafts, a saving in material was effected, since carbon steel could replace a more expensive alloy steel.

Dr. Osborn explained the principle of induction heating, the various types of units and frequencies available, and the limitations of each type. Higher frequencies, 300,000 to 500,000, tend to produce shallower heating or a skin effect, while lower frequencies, 2000 to 3000 cycles, are used for deeper heat penetration.

**265 Million Pounds of Nickel Used In Various Alloys in 1943, Mudge Says**

Reported by A. A. Breault

Brace-Mueller-Huntley, Inc.

The amount of nickel used in various alloys has grown from 77,000,000 lb. in 1918 during the first world war to 265,000,000 lb. used during 1943 in the present world war, said W. A. Mudge, assistant director of technical research on mill products in the Research and Development Division of the International Nickel Co., addressing the Schenectady Chapter on Oct. 10.

Dr. Mudge traced the early development of nickel from 235 B.C. to the present time and spoke at length on the various alloys in use today.

Before his lecture a sound movie showing International Nickel plants in Canada and the rolling mill in the United States was presented.

**Metal Treating Institute Elects Officers**

The Metal Treating Institute re-elected Horace C. Knerr, Metlab Co., Philadelphia, president at its 12th Annual Meeting in Cleveland on Oct. 15. L. A. Lindberg, Lindberg Steel Treating Co., Chicago, was elected vice-president.

The new board of trustees consists of Si Edwards, Industrial Steel Treating Co., Oakland, Calif.; Charles G. Heilmann, Commonwealth Industries, Inc., Detroit; Joseph H. Bockrath, Wiedemann Machine Co., Philadelphia; Walter G. Hamilton, Accurate Steel Treating Co., Chicago; George H. Porter, III, The Geo. H. Porter Steel Treating Co., Cleveland; and Charles I. Wesley, Wesley Steel Treating Co., Milwaukee.

Franklin T. Chapman, Metlab Co., was re-appointed treasurer, and Stewart N. Clarkson, 420 Lexington Ave., New York, executive secretary.

**Boston Chapter Has Outing in Beverly**

Reported by Horace Ross

Henry Disston &amp; Sons, Inc.

The first outing in several years of the Boston Chapter A.S.M. took place on Sept. 16 at the United Shoe Machinery Athletic Association Clubhouse in Beverly, Mass. The General Committee was headed by Dr. Peter R. Kosting of Watertown Arsenal.

Outdoor sports included golf, tennis, bowling on the green, horseshoes and baseball. Indoors were to be found billiards and bowling alleys. Overall was a group gambling wildly and enthusiastically with stage money supplied with each ticket.

In the evening a prize-drawing was conducted by George H. Burnett, past chairman, followed by a splendid musical Gay Nineties Revue provided by a group from the Tavern Players of Lynn, Mass.

**McGee Directs Advertising for Corronizing**

Donald L. McGee has been appointed director of advertising for the Corronizing Division of Standard Steel Spring Co., Coraopolis, Pa. He comes from Nutrition Research Laboratories, Chicago, where he was advertising manager.

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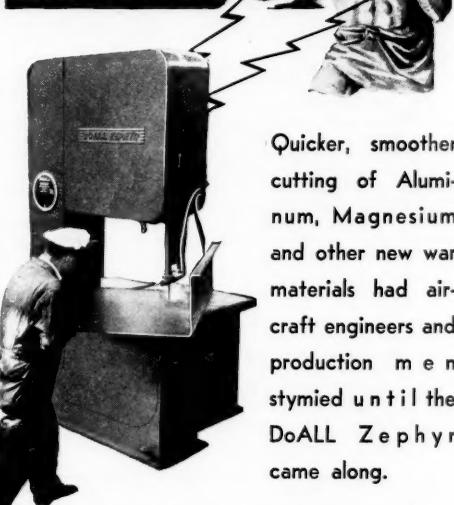
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# A.S.M. Review of Current Metal Literature—Continued

## 20. MACHINING (cont.)

**20-401. Adaptations of the Herbert No. 4 Senior Capstan Lathe.** *Engineering*, v. 158, Sept. 22, '44, pp. 226-227.

The Herbert No. 4 Senior "Eloptive" capstan lathe and an alternate arrangement of the headstock of the No. 4 Senior capstan lathe proper.

**20-402. Clamping Devices for Jigs and Fixtures.** *Die Werkzeugmaschine*, v. 47, no. 6, March '43, pp. 129-132.

*Engineers' Digest*, v. 1, Sept. '44, pp. 571-572.

A few typical devices.

**20-403. Automatic Drum Type Fixture Speeds up Drilling Work.** C. R. Phiffer. *Machinery*, v. 51, Oct. '44, pp. 151-152.

Devised for drilling large quantities of small aluminum supports.

**20-404. Machining Group-Forged Trip Levers.** Frank Hartley. *Machinery*, v. 51, Oct. '44, pp. 168-170.

Group milling of four parts from one forging.

**20-405. Machining Steel Parts on Automatic Screw Machines With Carbide Tools.** *Machinery*, v. 51, Oct. '44, p. 185.

Carbide-tipped tools give excellent results in machining both carbon and alloy steels in automatic screw machines. Production can be increased, unit costs reduced, and tool life prolonged.

**20-406. New Developments in Honing.** *Iron Age*, v. 154, Oct. 19, '44, pp. 67, 150, 152.

Automatic gaging of work in process, making production runs speedy and economical, and hogging out of heavier sections than were previously deemed practical are twin attributes of a new line of honing machines and sticks.

**20-407. High Speed Milling.** Kenneth Macker. *Metals and Alloys*, v. 20, Oct. '44, pp. 949-953.

Negative rake cutting defined; making the milling cutters; performance on specific jobs.

**20-408. The Art of Metal Cutting.** H. A. Frommelt. *Machine Tool Blue Book*, v. 40, Oct. '44, pp. 133-134, 136, 138, 140, 142, 144, 146, 148, 150, 152.

Historical developments.

**20-409. Carbide Milling of Steel.** H. L. Pope. *Machine Tool Blue Book*, v. 40, Oct. '44, pp. 157-158, 160, 162, 164, 166, 168, 170.

Progress toward a merger of art with science in the field of milling has been greatly stimulated during the past few years by the employment of super-high speeds, carbide cutting tools, and extremely careful determination of interrelated tooth angles.

**20-410. Fundamentals in Milling Practice.** H. A. Frommelt. *Machine Tool Blue Book*, v. 40, Oct. '44, pp. 199-200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 222, 224, 226, 228, 230.

Three fundamental principles of good machine tool practice: Good work piece set-ups, proper choice and assembly of cutters, and correct operation of the machines. Milling machine set-ups should be considered in terms of these fundamental principles.

**20-411. Sharpening Cutters for High Speed Carbide Milling.** *Machine Tool Blue Book*, v. 40, Oct. '44, pp. 243-244, 246, 248, 250, 252, 254, 256, 258, 260.

The grinding of carbides, like the entire high speed carbide milling program, is rapidly and continually undergoing improvements. Departures from, or improvements over previous recommendations.

**20-412. Machining Operations on the Sperry Gyro-Compass.** H. L. H. *Machinery* (London), v. 65, Sept. 7, '44, pp. 261-264.

The sensitive element; a profile-milling operation; balancing the rotor.

**20-413. Negative Rake on Cemented-Carbide Cutting Tools.** *Machinery* (London), v. 65, Sept. 14, '44, pp. 281-289.

Feeds and speeds for cemented-carbide tools; use of carbide tools on steel; Positive and negative rake milling compared; arbors; the milling cutter.

## 21. CLEANING AND FINISHING

**21-126. Factory Preweld Cleaning of 24-ST Alclad and 61-SW Aluminum Alloys with Hydrofluosilicic Acid Solution.** G. W. Scott, R. V. Ingram and A. A. Burr. *Welding Journal*, v. 23, Sept. '44, pp. 443-s-453-s.

Preweld cleaning solution for 24-ST Alclad aluminum alloys, consisting of a dilute solution of hydrofluosilicic acid,  $H_2SiF_6$ , to which a trace of a wetting agent is added.

**21-127. Surface Finish and the Function of Parts.** Georg Schlesinger. *Institution of Mechanical Engineers Journal*, v. 151, Sept. '44, pp. 153-165.

Given good design, a machine will work properly when the material, the fits and tolerances, and the quality of the surfaces are chosen to suit the working conditions. Examples.

**21-128. Distinctive Symbol Adopted to Designate Surface Finish.** James A. Broadston. *Product Engineering*, v. 15, Oct. '44, pp. 704-706.

Details of a method for indicating on drawings the allowable surface roughnesses on parts. Simple shop inspection tools for making a rapid determination of whether the surfaces fall within allowable roughness limits are reviewed.

**21-129. A Surface Finish for Magnesium Alloys.** N. H. Simpson and Paul R. Cutter. *Iron Age*, v. 154, Oct. 5, '44, pp. 54-58.

A finishing process which comes close to being ideal for magnesium alloys. Two coats of paint are sufficient for proper insulation, and high resistance to corrosion and abrasion and the decorative value of the finish could well have many post-war applications. The chemicals used are inexpensive, and the electrical equipment is not elaborate.

**21-130. PreCleaning Low Carbon Steel for Spot Welding.** Jean Gauthier. *Iron Age*, v. 154, Oct. 5, '44, pp. 66-67.

Simple procedure for removing oil, soil and oxide from low carbon steel sheets so as to assure structurally sound welds and to prepare a surface to which paint or plating readily adheres.

**21-131. Finishing Operations at Willow Run.** Bryant W. Pocock. *Products Finishing*, v. 9, Oct. '44, pp. 32-34, 36, 38, 40, 42, 44.

The technical considerations in the finishing of metal parts.

**21-132. Petroleum Thinners and Their Significance to Metal Finishing.** Jeffrey R. Stewart. *Products Finishing*, v. 9, Oct. '44, pp. 48, 49, 50, 52, 54, 58, 60.

Methods for evaluating petroleum thinners; the correct method for determining solvent power.

**21-133. Care and Correct Use in Automatic Spray Finishing.** Frank V. Faulhaber. *Products Finishing*, v. 9, Oct. '44, pp. 76-78, 80, 82, 84, 86.

Automatic spraying permits economizing of floor space, by itself, but the equipment should also be so arranged as to coordinate efficiently with other necessary finishing processes and operations.

**21-134. Polishing and Buffing Die Castings.** L. Ralph Eastman. *Die Casting*, v. 2, Oct. '44, pp. 82, 84, 86.

The materials and methods to be employed in finishing die castings depend on the type of metal, the condition of the surface as the parts reach the polishing and buffing department, and the type and quality of finish required; also, to some extent, on the volume of production, which determines whether hand or automatic equipment is to be employed.

**21-135. Cleaninghouse Practice.** F. P. Spruance. *Wire & Wire Products*, v. 19, Oct. '44, pp. 671-675, 678-679.

Inhibitors are being generally used in the pickling of rods and wire, both of low and high carbon and of alloys. Improved practice of copper coating has resulted in better coated wire, facilitated drawing and extended die life. While copper coatings oxidize rapidly, their resistance to corrosion may be extended by a newly developed process which, with modification, may still further improve drawing.

**21-136. Electrostatic Spraying and Detearing.** Harry Forsberg. *Iron Age*, v. 154, Oct. 19, '44, pp. 50-54.

Even complex metal parts now are painted automatically, economically, and with superior finish by spraying in an electrostatic field. Similar desirable results attend the electrostatic detearing of parts dipped in paint.

**21-137. Measuring and Designating Surface Finish.** James A. Broadston. *Iron Age*, v. 154, Oct. 19, '44, pp. 62-66.

Types of surface irregularities and standards of roughness values.

**21-138. The Principal Health Hazards in Metal Finishing Departments and Their Control.** Merrill Eisenbud. *Metal Finishing*, v. 42, Oct. '44, pp. 602-605.

Alkali cleaning and finishing; pickling vats; nitrous fumes; chromic acid; cyanide plating; abrasive blasting; buffing; dermatitis; degreasing.

**21-139. Plastic Finishing of Metal Products.** Haviland F. Reeves. *Metal Finishing*, v. 42, Oct. '44, pp. 647-649.

Specifications applications.

**21-140. Centrifugal Finishing.** John E. Hyler. *Metal Finishing*, v. 42, Oct. '44, pp. 650-652.

Centrifugal enameling.

**21-141. Wetting Agents—Their Use in Electroplating and Allied Processes.** H. Silman. *Electrodepositors' Technical Society Preprint*, v. 19, '44, pp. 131-146.

Soap materials employed. Sulphated fatty alcohols, aryl alkyl sulphonates, cation-active materials, petroleum derivatives. Wetting agents in cleaning solutions; electrolytic cleaners; foaming; testing of cleaners; pickling processes; inhibitors; dragout; spot-welding of light alloys; electrodeposition; bright nickel deposits; tin plating; soldering. 17 ref.

**21-142. Electrostatic Air Cleaning Safeguards Weirton's Electrical Equipment.** Steel, v. 115, Oct. 23, '44, pp. 86, 88.

Maintenance work on prime movers is reduced one-half and their life increased considerably by cooling with cleaned air. Bank of cells now employed to supply clean air to electrical units serving electrolytic tinning lines are relieved of entrapped dirt by automatic washer.

**21-143. Cleaning and Descaling Steel by Electrolytic Pickling in Molten Caustic Soda.** N. L. Evans. *The Iron and Steel Institute April '44. Engineers' Digest*, v. 1, Sept. '44, pp. 568-570.

Cell installation preliminary work to establish broad principles of operation; scheme of work; efficiency of descaling; removal of sponge iron after descaling; investigation of causes of brown stain.

## 22. WELDING, BRAZING AND FLAME CUTTING

**22-452. Spot Welding on the "Lancaster".** Welding, v. 12, August '44, pp. 354-362.

Latest methods of aircraft production; spot welding equipment used; electrode tips; cleaning of material; inspection and testing; production methods.

**22-453. Progress in the Spot Welding of Heavy Mild Steel Plates.** H. E. Dixon. Welding, v. 12, August '44, pp. 368-374.

The welding of thin mild steel sheet; difficulties encountered in the spot welding of heavy mild steel; survey of early progress in heavy spot welding methods; heavy spot welding methods.

**22-454. Fabrication of Tractor Wheels.** N. B. Cave. Welding, v. 12, August '44, pp. 375-376.

Utilization of arc and flash butt welding.

**22-455. Welding of Aluminum Bronzes.** Welding, v. 12, August '44, p. 377.

Application of "Bronalex" electrodes.

**22-456. Fabrication Methods.** J. A. Dorrat. Welding, v. 12, August '44, pp. 384-396.

Manipulators and automatic welding.

**22-457. Design and Methods of Construction of Welded Steel Merchant Vessels.** Welding Journal, v. 23, Sept. '44, pp. 794-807.

Investigation of the possible defects which have led to the fracture of ship structure afloat.

**22-458. Welding Aluminum and Its Alloys.** Welding Journal, v. 23, Sept. '44, pp. 808-811.

Welding properties of aluminum; joint design for aluminum welds; preparation for welding; use of flux; cleaning and finishing; control of the puddle; welding sheet aluminum; welding aluminum plate; heavy plates and castings.

**22-459. Proposed Recommended Practices for Resistance Welding.** Welding Journal, v. 23, Sept. '44, pp. 812-817.

Recommended practice for the flash-butt welding of low and medium strength forging steels.

**22-460. The Surface Treatment at Room Temperature of Aluminum Alloys for Spot Welding.** W. F. Hess, R. A. Wyant and B. L. Averbach. Welding Journal, v. 23, Sept. '44, pp. 417-s-435-s.

The discovery and development of a new solution for the surface preparation of Alclad 24S-T. This solution (No. 14) is very satisfactory from all points of view, and possesses the highly desirable advantage of operating at room temperature. 3 ref.

**22-461. The Spot Welding of 0.037-in. Aluminized Low-Carbon Steel.** H. W. Brown. Welding Journal, v. 23, Sept. '44, pp. 458-s-473-s.

Calibration of pressure gage; physical properties and general characteristics of aluminized steel; effect of tip shape; effect of surface cleaning of material; effect of specimen width; characteristics of welds in 0.0375 aluminized steel; dispersion; corrosion. 29 ref.

**22-462. Fabrication and Welding of Large Transformer Tanks.** H. W. Allison. Steel Processing, v. 30, Sept. '44, pp. 563-567.

Permanent oil tightness and a mechanical strength capable of supporting from 6 to 8 times its own weight are the primary requisites of large power-transformer tanks.

**22-463. The Design, Preparation and Use of Silver Braze Joints.** A. M. Setapen. Steel Processing, v. 30, Sept. '44, pp. 568-573.

The use of low temperature silver brazing alloys in the fabrication of materials prepared from pressed metal parts.

**22-464. Surface Preparation for Spot Welding Aluminum.** G. Thornbury. Iron Age, v. 154, Sept. 28, '44, pp. 46-49.

A new type of etchant has been developed that removes soil and oxide film without attacking the substrate metal and produces uniform surface contact resistance so desirable for consistent spot welds.

**22-465. Welding Stainless Steel.** Aircraft Production, v. 6, Sept. '44, p. 249.

Influence of flame adjustment and fluxes when gas welding exhaust manifolds.

**22-466. Metallic Arc Welding Electrodes.** Harold Lawrence. Steel, v. 115, Oct. 2, '44, pp. 98, 100, 103, 114, 116.

Readily applied to pure nickel and high nickel alloys. Techniques involved are much like those for fabricating mild and stainless steels.

**22-467. Roller Mill Maintenance.** Theodore W. Morgan. Iron & Steel, v. 17, Sept. '44, pp. 603-606.

Day-to-day maintenance problems and the way in which welding has been employed in dealing with them. It has been found that through an extended use of welding methods costs can be materially cut and the time needed for repairs reduced, in some cases, by months.

**22-468. Electronics Now Permits Balanced 3-Phase Resistance Welding.** G. W. Birdsall. Steel, v. 115, Oct. 9, '44, pp. 126-127, 278, 280, 282, 284.

New system puts perfectly balanced load on all three phases of power line, thus greatly extending scope of resistance welding processes, including the joining of 3/4-in. plates.

**22-469. Metallic Arc Welding Electrodes.** Harold Lawrence. Steel, v. 115, Oct. 9, '44, pp. 136, 138, 304, 306, 308.

Once the idiosyncrasies of copper materials are understood, competent structures may be built with confidence by welding.

**22-470. Impedance of Welding Cable Laid on a Steel Deck.** F. Braillsford. Welding, v. 12, Sept. '44, pp. 398-401.

The impedance of the circuit comprising a welding cable laid on a steel deck with the current returning through the ship's hull is calculated. The calculations are based on a number of simplifying assumptions since a rigid mathematical solution does not appear to be possible. Curves are given for various sizes of cable showing the total impedance and its various constituent components of resistance and reactance.

**22-471. Progress in the Spot Welding of Heavy Mild Steel Plates.** H. E. Dixon. Welding, v. 12, Sept. '44, pp. 402-410.

Pulsation welding; conventional a. c. method using high currents and short continuous welding times; "forged-spot" welding; Temp-a-Trol spot welding; production of spot welds of good strength consistency; value and future of heavy spot welding methods. 14 ref.

**22-472. Vertical Boiler Welding Repairs.** J. K. JohanneSEN. Welding, v. 12, Sept. '44, pp. 413-417.

Welding aids swift and efficient maintenance.

**22-473. The Welding Department.** H. Marquand. Welding, v. 12, Sept. '44, pp. 418-421.

Advice is given regarding the selection of the various processes available. The best methods of organizing a welding shop are discussed and also the means of securing efficient control over production.

**22-474. Progress in Research.** Welding, v. 12, Sept. '44, pp. 422-423.

Weldability of silicon-manganese steels; peening. 5 ref.

**22-475. Recent Developments in the Welding of Light Metals.** W. K. B. Marshall. Welding, v. 12, Sept. '44, pp. 432-438.

Gas welding magnesium—best alloy; removal of flux residues; finishing; properties of gas welds.

**22-476. Roll Gun Welders Fabricate Steel Jettison Tanks.** John C. Silliman. Iron Age, v. 154, Oct. 12, '44, pp. 67-73.

Difficulties in resistance welding jobs can often be traced to inadequate preliminary production planning and cost analysis, improper tooling or failure to control welding processes. Step-by-step description of the planning required for economical tooling up for resistance welding of gasoline tanks, and a detailed description of the special portable roll welding guns and fixtures.

(Continued on Page 19)

## Grotts Heads Research and Metallurgy for Porter Plants

H. K. Porter Co., Inc., of Pittsburgh, announces the appointment of Fred Grotts, president of its subsidiary, Fort Pitt Steel Casting Co., to a newly created position, in addition to his present one, as director of research and metallurgy for all Porter plants.

In this new capacity, Mr. Grotts will have charge of problems relating to materials of all types, metallurgy, and practices on present products. He will establish a technical and engineering advisory service for customers on materials and specifications, and direct new product developments.

Mr. Grotts, a national authority on heat treatment of cast steel and cast iron, served in World War I as metallurgical and chemical engineer with Curtiss Aeroplane & Motor Corp. He later held positions as foundry manager and technical supervisor for Caterpillar Tractor Co.; as wheel plant superintendent for American Steel Foundries; and as director of metallurgical activities for Hubbard Steel Foundry and Wheeling Mold & Foundry Divisions of Continental Roll & Steel Foundry Co.



Fred Grotts

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Address answers care of A.S.M., 7301 Euclid Ave., Cleveland 3, Ohio, unless otherwise stated. Applicants for the positions listed below are required to observe the rules and regulations of the War Manpower Commission regarding a Statement of Availability, if employed in an essential activity.

### Positions Open

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**GRADUATE METALLURGIST:** Preferably with one or two years' experience on cast iron. Applicant should be willing to work in foundry and laboratory machine shop as well as at the microscope and in the office; should be skilled in photography, able to write reports and keep records. Small laboratory staff with widely varied research projects. Chicago. Box 11-10.

**METALLURGIST:** To take charge of spectrographic and chemical laboratory for aluminum alloy producer. Young man with non-ferrous foundry experience preferred. Box 11-15.

**COMBINATION WELDING METALLURGIST AND INSPECTOR:** To take complete charge of welding metallurgy, inspection and quality control for company producing heavy trucks and similar equipment. Young engineering graduate with experience in welding metallurgy and machine production preferred. Excellent future with well-established medium sized company. Location Cleveland. Box 11-20.

**METALLOGRAPHER:** Graduate metallurgical engineer with experience in both ferrous and non-ferrous metallography. Must be capable of directing effort in this field as related to development, research and general engineering metallurgical projects. Box 11-25.

**METALLURGICAL ENGINEER:** With specific interest in metallurgical development and not routine engineering. Advanced engineering degree preferable, and must be capable of planning and prosecuting developmental metallurgical work. Box 11-30.

**MANUFACTURING SUPERINTENDENT, PRECISION CASTINGS:** Large manufacturer in the east entering the field of precision castings, needs an experienced man to plan equipment and layout, supervise installation and take charge of all manufacturing operations. State experience and salary desired. All replies held in strictest confidence. Box 11-60.

**SALES MANAGER:** For well-established engineering organization devoted to design and construction of specialized industrial electric, gas and oil fired heat treating furnaces. Preferably experienced in directing and obtaining sales of specialized heat treating equipment or kindred lines. Location New England. Box 10-5.

**SALES ENGINEER:** Preferably with metallurgical or engineering background and some experience in brass mill production or brass mill sales. To handle Detroit sales office of prominent non-ferrous firm. Fixed salary with expenses. Box 10-40.

**METALLOGRAPHER:** Experienced in preparing and determining metallographic specimens; experienced women may apply. **NON-FERROUS METALLURGIST:** For work on aluminum and magnesium. **POWDER METALLURGIST:** **METALLURGICAL ENGINEER:** For development work on steel forgings, tool steels. **RESEARCH METALLURGIST:** Work on special alloys to be used at elevated temperatures. Write Supervisor, Technical Department, 306 Fourth Ave., Pittsburgh Pa. Westinghouse Electric & Mfg. Co.

**REPRESENTATIVES:** If you now cover the steel or allied industries—the non-ferrous metal trade or die casting industries—we have two products that should add materially to your income. Both are beyond the experimental stage and have proven their worth in actual use. Letters from hundreds of prospects assure a ready market. If interested, tell us the territory you now cover and the companies you now represent. Replies held in strictest confidence. Box 11-75.

**CHEMIST:** With some metallurgical training or experience to take charge of inorganic laboratory in northern New Jersey. Peacetime position. State full particulars and salary expected. Box 11-80.

**METALLURGIST:** For company laboratory. Experience in stainless steel, Inconel and other similar alloys required. Excellent post-war possibilities with Southern California company having national reputation in use of these alloys. Box 11-85.

### Aircraft Forgings Must Meet Exacting Requirements

Reported by G. L. White

Editor, Canadian Metals and Metallurgical Industries

Speaking at the opening meeting of Ontario Chapter A.S.M. on Sept. 15, A. J. Pepin, chief metallurgist, Worcester Division, Wyman-Gordon Co., described the manufacture of forgings to meet the exacting requirements of the aircraft industry.

The speaker pointed out that parts with high tensile strength are necessary in building aircraft engines with low weight for the horsepower developed. There are many instances where the horsepower of an aircraft engine has been more than doubled without major changes in design, and the only answer to such requirements is the use of aircraft quality forgings for critically stressed engine parts.

In normal times the selection of heats of steel could be utilized as an important factor in the production of aircraft quality forgings. Although it has not been possible to follow this plan under pressure of war production, close control of materials and their processing has enabled the maintenance of high quality.

The speaker described the comparatively simple

### CONSOLIDATED VULTEE AIRCRAFT Fort Worth, Texas, Division Needs

#### Laboratory Assistants Technicians Metallurgist

With one year's experience in ferrous and non-ferrous metallurgical work preferably aircraft experience dealing with light alloys. College degree is not necessary provided the individual has sufficient other technical background in this field.

### Positions Wanted

**GRADUATE METALLURGICAL ENGINEER:** B.S. Case School of Applied Science. Not employed at highest skill and can get release. Desires position in development and promotion of company products. Age 23 years. Medical discharge from Army does not limit capabilities. Salary open. Box 11-35.

**METALLURGIST:** Graduate with eight years' experience in metallography, spectrography, mill control, research with prominent brass manufacturer; some technical service experience; 18 months as chief metallurgist with small manufacturing company, including design of complete metallurgical laboratory. Desires connection with progressive firm with post-war future. East or mid-west preferred, but free to move. Box 11-40.

**METALLURGIST:** Recent graduate; 1½ years' experience as research metallurgist. Production research and process control of aircraft materials, inspection and testing; some experience with color photomicrographs. Also can take charge of ferrous or non-ferrous heat treating department. Future more desirable than high defense plant pay. Available on two weeks' notice. Would consider foreign assignment. Box 11-45.

**SALES REPRESENTATIVE:** Nine years with prominent cold drawn steel producer; two years with high grade tool steel supplier. Prefer connection with producer of all steels. Box 11-50.

**CERAMIC ENGINEER:** Seven years' experience in field of super-refractories. Practical application of refractories in designing metallurgical furnaces and developing special refractories; supervision of installation in furnaces. Desires position with definite post-war assurances. Box 11-55.

**METALLURGIST—MATERIALS ENGINEER:** Age 35; married. 14 years' experience non-ferrous and ferrous metallurgy and metallography, foundry, all types of fabrication and heat treatment. Capable of establishing and managing control and research laboratory. Location New York City or vicinity. Box 11-65.

**METALLURGIST:** Metallurgical graduate; four years' experience in inspection, supervision of personnel, training of new employees. Would like position in process development or heat treating control, preferably in a fabrication plant. Location east or southwest. Box 11-70.

**METALLURGIST:** Age 30, experienced in manufacture, fabrication, control testing and heat treatment, both ferrous and non-ferrous. Now in charge of metallurgical control and research laboratory. Desires responsible, permanent position. Box 11-90.

**SALES ENGINEER:** West or west coast, either in sales and service or heat treat control. Ten years' practical and technical heat treating and metallurgical experience, with large manufacturer of tool, alloy and stainless steels; 15 years as sales and service engineer. Box 11-95.

**FOR SALE—Homo Furnace, 800°, 250 D.C., 12 kw., with L & N Potentiometer, Motor Generator Set and G.E. Panel.** Address Box 10-1, The Metals Review, 7301 Euclid Ave., Cleveland 3, Ohio.

flow sheet of an aircraft forging plant, outlining briefly the types of equipment employed, some of the steels used, the parts made from them, and the testing and heat treatment methods required for aircraft forgings.

Very careful chemical and physical examination of the raw material is necessary and after closely controlled processing, parts are subjected to exacting inspection, the details varying with the nature of the forging.

The speaker outlined briefly the changes that have been made in heating and heat treating furnaces in the aircraft forging industry. Box furnaces for heating steel for forging are disappearing and in their place are employed safer automatic temperature and time-controlled furnaces of the rotary or pusher types.

### Pittsburgh Engineering Companies Merged

The Amsler-Morton Co., internationally known engineers in the steel and glass industries, announced a merger with Pennsylvania Industrial Engineers, Inc., Pittsburgh, which will continue operations as a division of Amsler-Morton. Oscar R. Olson, formerly president of Pennsylvania Industrial Engineers, Inc., has been elected president of The Amsler-Morton Co.

# A.S.M. Review of Current Metal Literature—Continued

## 22. WELDING (Cont.)

**22-477. Economics of Welded Fabrication Sure to Attract Postwar Industry.** American Machinist, v. 88, Oct. 12, '44, pp. 91-100.

Pressure welding makes strong butt joints; arc welding made war production possible; savings possible through automatic arc welding; versatility characterizes resistance welding; electrodes are water cooled or refrigerated; careful inspection insures against faulty welds; designs must be made with welding in view.

**22-478. Patrol Craft Mass-Produced on Welding Assembly Line.** F. M. Gunn, American Machinist, v. 88, Oct. 12, '44, pp. 119-123.

Complete hull and deck sections are fabricated indoors in jigs. The finished sections are then shipped to yards for final assembly.

**22-479. Aluminum Electrodes.** Harold Lawrence. Steel, v. 115, Oct. 16, '44, pp. 108, 110, 150, 152.

Coated arc welding electrodes now prevent interference of aluminum oxide in production of slag-free welds in aluminum. Both wrought and cast aluminum parts readily fabricated by arc welding, except 24S alloy which loses high physical properties at and around the weld. This concludes series on arc welding electrodes.

**22-480. Welding Cheats Davy Jones.** T. B. Jefferson. Welding Engineer, v. 29, Oct. '44, pp. 44-46.

The job the Puget Sound Navy Yard is doing to keep Uncle Sam's fighting ships in the fight.

**22-481. Spot Welding Armor Plate.** Fred A. Lee. Welding Engineer, v. 29, Oct. '44, pp. 47-51.

A major departure from conventional spot welding is a new control which permits preheating, grain refinement, tempering, forging to be done on the welding machine.

**22-482. Arc Welding Armor Plate.** Brigadier W. M. Blagden. Welding Engineer, v. 29, Oct. '44, pp. 52-55, 74.

Our British allies have experienced a parallel development in tank construction and now employ many of the processes and procedures used for welding armor in the U.S.

**22-483. Saved: Oxygen and Acetylene.** Don Llewellyn. Welding Engineer, v. 29, Oct. '44, pp. 56, 58-59.

There are a thousand ways to waste cutting gases in a shipyard, but even a myriad of leaks may be plugged by intelligent, persistent effort. How Calship employees cooperated to conserve vital gases.

**22-484. Which Size for First Pass?** Joseph S. Wright. Welding Engineer, v. 29, Oct. '44, pp. 60, 62.

Where deep penetration is wanted on a tight butt weld, is it advisable to use a  $\frac{1}{8}$  in. or a  $\frac{3}{16}$ -in. electrode on the first pass?

**22-485. Operation of Single-Phase Welder From Three-Phase Supply.** Engineering, v. 158, Sept. 15, '44, p. 206.

The main object of reducing the welding load on the supply cable, and thus enabling it to carry new additional load, satisfactorily accomplished; it is understood that a further 150-kva. to 200-kva. can now be carried by the same cable.

**22-486. Helium-Shielded Arc Welding of Stainless Steel Exhaust Collectors.** Francis H. Stevenson. Welding Journal, v. 23, Oct. '44, pp. 873-876.

The 18-8 type of stainless steel is used almost exclusively in the manufacture of exhaust collectors. Two of the points which cause the welder and user of this steel difficulty are carbide precipitation and distortion.

**22-487. Arc Welding Practice in the Steel Foundry.** Frank Kiper and Lawrence Gabes. Welding Journal, v. 23, Oct. '44, pp. 877-881.

"Know welding" men at the Ohio Steel Foundry Co. have set up easy to follow practices which fulfill all specification requirements as well as good practice principles.

**22-488. Small Portable Condenser Welding Set.** E. M. Callender. Welding Journal, v. 23, Oct. '44, pp. 882-890.

The portable discharge welder is one of four units comprising a complete field repair outfit. This welder is light, mobile, and employs an unusually small welding transformer. It is designed to operate in conjunction with a portable hand air gun, and with long secondary welding cables that produce a much higher impedance secondary circuit than is normally permissible in most discharge welding machines.

**22-489. Evolution of Welding in Shipbuilding.** M. N. Malteff. Welding Journal, v. 23, Oct. '44, pp. 906-911.

Some of the main points in the evolution of ship construction, from a welding standpoint.

**22-490. Low-Reactance Cables for Portable Resistance Welders.** Myron Zucker. Welding Journal, v. 23, Oct. '44, pp. 911-915.

Mechanical and economic values of the interleaved welding cable grew out of the development of a design to improve the electrical effectiveness of gun welding equipment.

**22-491. Standard Details for Welded Building Construction.** H. W. Lawson. Welding Journal, v. 23, Oct. '44, pp. 916-933.

There is now an adequate basis in research, particularly in that conducted over the last 15 years at Lehigh University, to justify an agreement on the principles of design for beams and their welded connections. A set of welded details which with their capacities, are ready for handbook publication and general professional acceptance. 15 ref.

**22-492. Fundamentals of Heavy Cutting.** G. L. Walker and H. G. Hughey. Welding Journal, v. 23, Oct. '44, pp. 934-942.

A study of the problem of cutting heavy sections, intended to bring out information of importance in the design of equipment and in the conditions of use.

**22-493. Characteristics of Welding Arcs on Aluminum in Atmospheres of Helium and Argon.** F. A. Wassell. Welding Journal, v. 23, Oct. '44, pp. 487-493-s.

An investigation, based on the principle of gas-shielded arc welding, utilizing inert gases such as helium and argon, for the purpose of developing a process which would eliminate the use of flux in the welding of aluminum. Some unusual and interesting phenomena observed during this investigation.

**22-494. The Geometry of the Spot-Welding Tip and Its Relation to Tip Life.** Earl D. Crawford and C. Weston Steward. Welding Journal, v. 23, Oct. '44, pp. 494-s-498-s.

A microscopic examination of the tips after a successful run showed a definite, raised, flat-ended button on what had originally been a 3-in. radius dome.

**22-495. The Effect of Metallurgical Changes Due to Heat Treatment Upon the Fatigue Strength of Carbon Steel Plates.** Walter H. Bruckner and Wm. H. Munse. Welding Journal, v. 23, Oct. '44, pp. 499-s-510-s.

Tests to determine the effect of metallurgical changes associated with welding, without actually depositing a weld, upon the fatigue strength of carbon steel specimens.

**22-496. Some Observations on the Welding of Manganese Steels.** W. B. Brooks and A. G. Waggoner. Welding Journal, v. 23, Oct. '44, pp. 511-s-523-s.

Theory of hardenability as applied to welding. The hardenability of manganese steels studied by means of the L-Jominy test. Weldability studied by means of slow notch bend test and microhardness surveys. Actual hardenability of low-carbon manganese steels substantially less than the calculated value. The L-Jominy test does not predict relative weldability as judged by maximum hardness and slow notch bend angles. The effect of varying base metal temperatures from 30 to 150° F. Based on examination of the hardenability and strengthening effects of various elements, a high-tensile steel having a low weld hardenability is designed and tested. 23 ref.

**22-497. The Bead-Weld Nick-Bend Test for Weldability.** Clarence E. Jackson and George G. Luther. Welding Journal, v. 23, Oct. '44, pp. 523-s-535-s.

A review of the various direct and indirect methods for determining weldability. 13 ref.

**22-498. The Effect of Postheat in Welding Medium Alloy Steels.** Myron A. Pugacz, Geoffrey J. Siegel and Jay O. Mach. Welding Journal, v. 23, Oct. '44, pp. 536-s-544-s.

The conclusions drawn from this study suggest the possibility of advancing aircraft design by making use of lighter sections to obtain required physical properties and increasing the reliability of present design values. The importance of controlling the postheat time and temperature in other applications such as the welding and the flame cutting of engineering steels and other medium alloys of any gage is also indicated.

**22-499. Salt Baths for Copper Brazing.** Charles R. St. John. Metal Progress, v. 46, Oct. '44, p. 715.

This salt quench checks the flow of copper immediately, eliminating any tendency to run or blow or form a blob on the surface of the work.

**22-500. Wing Routing the "Skytrain" & "Dauntless."** Gordon B. Ashmed. Modern Industrial Press, v. 6, Oct. '44, pp. 35-36, 44.

Joining problems of rather cumbersome assemblies.

**22-501. Electronic Controls for Resistance Welding.** Holbrook L. Horton. Machinery, v. 51, Oct. '44, pp. 153-159.

Method of controlling heat generated at the weld; non-synchronous and synchronous timing control; elements of the spot-weld cycle; semi-automatic weld timers; automatic weld timers; sequence timers; resistance welding before the war; electronic controls for the storage type of welders; electronic controls with special functions.

**22-502. Unique Jig Devised for Canteen Welding.** W. F. Lautner. Machinery, v. 51, Oct. '44, pp. 162-163.

Oxy-acetylene welded aluminum canteens turned out on jigs, of a unique design devised by the company.

**22-503. So—You Want to Own Your Own Job Shop.** E. S. Wheeler. Industry and Welding, v. 17, Oct. '44, pp. 42-43, 114-115.

Pitfalls and suggestions on how to avoid them, for the man contemplating opening his own shop.

**22-504. Maintenance Welding at American Airlines.** F. R. Cassel. Industry and Welding, v. 17, Oct. '44, pp. 54-56.

Maintenance and fabricating welding plays a leading role in keeping hard-to-get equipment in the air.

**22-505. Blazing the Trail with Welded Construction.** G. S. Storatz. Industry and Welding, v. 17, Oct. '44, pp. 74-78.

General problems and approach.

**22-506. A New Fabrication Method—Multiarc Welding.** Malcolm C. Rivenbaugh and C. Weston Steward. Steel, v. 115, Oct. 23, '44, pp. 68-71, 96.

Twin carbon torch produces five arcs simultaneously to deliver concentrated heat under perfect control.

**22-507. The Joining of Metal.** J. Aherne-Heron and L. N. Smith. Aircraft Engineering, v. 16, no. 180, Feb. '44, pp. 59-60. Engineers' Digest, v. 1, Sept. '44, pp. 581-582.

Inefficiency of present methods and possibilities for development of new forms of jointing.

**22-508. Recent German Developments in Electric Welding.** M. W. Bourdon. Automotive Industries, v. 91, Oct. 1, '44, pp. 35-37, 98.

The Weibel method for welding light-alloy sheets and the development of miniature arc-welding equipment for joining wires.

**22-509. Some Brazing Tips.** Lawrence D. Jennings. Machine Tool Blue Book, v. 40, Oct. '44, pp. 173-174, 178, 180, 182, 184, 186, 188, 190.

Economy, strength, ductility, conductivity, corrosion, types of joints, brazing alloys, cleaning, fluxing, heating, dip brazing, resistance brazing, furnace brazing, removal of flux.

**22-510. Effect of Time of Storage on Ductility of Welded Test Specimens.** Clarence E. Jackson and George G. Luther. American Institute of Mining & Metallurgical Engineers Technical Publication no. 1772, 8 pp.

Development of nick-bend test designed for studying the effect of welding on the ductility of a steel. 3 ref.

## 23. INDUSTRIAL USES AND APPLICATIONS

**23-276. Engine Bearings.** Automobile Engineer, v. 34, August '44, p. 313.

Requirements conducive to long life.

**23-277. Production of Steel and Brass Instrument Cases.** R. M. Brown. Welding, v. 12, August '44, pp. 363-367.

Fabrication of instrument cases from 16 S. W. G. mild steel, arc welded with "Transweld" shielded arc electrodes and from .062 alpha brass sheet manufactured by the carbon arc welding process without filler wire. Use of higher currents increased the welding speed and produced a better finish.

**23-278. Perishable Tools.** F. A. Lutz. Army Ordnance, v. 27, Sept.-Oct. '44, pp. 285-288.

Economies achieved in small-arms ammunition production.

**23-279. Notes on Magnesium Alloy Applications in Aircraft and Allied Industries and on Alloy Compositions.** G. Goddard. Magnesium Review, v. 4, April '44, pp. 35-44.

Magnesium base alloys; wrought and cast alloys; composition and properties of magnesium base cast and wrought alloys in use in Great Britain and in the United States.

**23-280. Low Cost Tools.** Steel, v. 115, Oct. 2, '44, p. 80.

Built without elaborate designs and drawings, yet require little testing.

**23-281. Light Weight Tanks.** Steel, v. 115, Oct. 2, '44, pp. 82, 85.

Drawn from long terne sheets and joined by torch, spot and continuous seam resistance welding. Special jigs and fixtures aid production.

**23-282. Automobile Castings.** Automobile Engineer, v. 34, Sept. '44, pp. 352-359.

The Company's latest plant for the large-scale production of cylinder blocks, cylinder heads and brake drums.

**23-283. National Emergency Steels.** Steel, v. 115, Oct. 9, '44, pp. 168, 169, 170.

Lean alloy types are here to stay with 68.3% of metalworking plants likely to use them after the war. High alloy steels remain in favorable position with use indicated by 92.2%.

**23-284. Castings, Stampings, Forgings and Die Castings.** Steel, v. 115, Oct. 9, '44, pp. 172-173, 176, 178.

Stampings expected to show largest percentage gains in post-war product designs, although substantial increases also are indicated for other types of fabrications. Castings find most widespread usage.

**23-285. Buick Builds "Hellcats" Which Are Formed of a Wide Variety of Parts.** Steel Processing, v. 30, Oct. '44, pp. 648-651.

Final form is a 19-ton, high-speed, heavy fire power, armored vehicle representing the latest tactical use of supermobilized artillery.

**23-286. Jessop's Stainless-Clad Steel Economical for Many Purposes.** W. M. Crouch. Steel Processing, v. 30, Oct. '44, pp. 652-655.

Uses and advantages.

**23-287. Veterans Return!** R. A. Road. Die Casting, v. 2, Oct. '44, pp. 30-31.

Simplicity of pieces, and reduction of assembly time are important reasons for the return to the use of die castings after experience with steel fabrication.

**23-288. Again and Again Die Castings Show Their Worth.** D. P. Hoover. Die Casting, v. 2, Oct. '44, pp. 35-36, 68.

The dynamic strength of the die castings in duplicating machines—which take more than 3600 thrusts per hour—should not be overlooked by the designer.

**23-289. Advantages and Specifications of Fine-Pitch Gears.** Product Engineering, v. 15, Oct. '44, pp. 897-901.

Gears having 30 diametral pitch and finer, and employing the involute tooth form are discussed. Recent developments in gear cutters, shavers, and inspection tools for manufacturing fine-pitch gears are reviewed. Common errors in the design of such gears are pointed out.

(Continued on Page 20)

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# A.S.M. Review of Current Metal Literature—Continued

## 23. INDUSTRIAL USES (cont.)

23-290. The Production of Helmets at McCord Manufacturing Co. Modern Industrial Press, v. 6, Oct. '44, pp. 22, 24, 46.

Center of the operation in the manufacture of steel helmets is a 500-ton mechanical press which transforms a wafer of exceptionally hard manganese steel into a battle helmet in a matter of seconds. A 7-in. draw is made successfully by almost completing the press cycle on the first strike and allowing a slight pause to permit the metal to assume its outline in the rough and then completing the press cycle. This slight pause permits completing the process without fracturing the metal.

23-291. Building LCM-3 Invasion Barges for the U. S. Navy. Raymond J. Fitness. Modern Industrial Press, v. 6, Oct. '44, pp. 30-31, 46.

Equipment and processes.

23-292. The Manufacture of the American Machinery (London), v. 65, Sept. 21, '44, pp. 309-318.

Flow methods in the production of an improved petrol container.

23-293. Experience in War Production Points to the Future of Die-Castings in Peacetime. R. L. Wilcox. Machinery, v. 51, Oct. '44, pp. 160-161.

Because of efficient use of materials, machines, and labor, die casting method of fabrication will undoubtedly be used to a greater extent than ever in the manufacture of consumer goods in the post-war civilian economy.

23-294. Roll Neck Bearings. L. R. Underwood. Engineers' Digest, v. 1, Sept. '44, pp. 582-583.

Lignofol and Lignostone bearings; bearings composed of wood and synthetic resin; manufacture and properties of Lignofol; manufacture and properties of Lignostone; design, installation and operation.

23-295. Cadillac Concentrates over 1500 Production Machines. Joseph Geschelin. Automotive Industries, v. 91, Oct. 1, '44, pp. 24-30, 54.

Cadillac has extended the scope of aircraft parts production to a large group of major parts and complete assemblies. Among the most accurately finished parts are the supercharger rotor vanes, which are balanced to 0.004 oz.; and bearing cages, where the total variation in hole size, after pressing into the case, is held to 0.0005 in.

23-296. Gyroplots in Quantity Production at Auto-Lite. Joseph Geschelin. Automotive Industries, v. 91, Oct. '44, pp. 38-40, 62.

Precision is the key to the operation—precision in manufacturing, great care in assembly, unusual precautions as to cleanliness. Most bores and ground diameters are held to 0.0002 and 0.0003 in.

23-297. Manufacture of the Vickers Self-Aligning Bearing. Machinery (London), v. 65, Sept. 7, '44, pp. 257-259.

Eliminates the necessity for the ball bearings formerly employed for connecting articulating levers and similar parts.

## 24. DESIGN

24-49. The Production of Aircraft Stampings. J. A. Oates. Aircraft Production, v. 6, Sept. '44, pp. 413-424.

Layout of a typical High Duty Alloy Ltd. factory; crankcase production; furnace design.

24-50. Stainless Steel Stampings for Ship Parts. W. J. Meinal. Metals & Alloys, v. 20, Sept. '44, pp. 616-619.

Application of a modern structural and corrosion resisting materials—stainless steel—and a modern metal-form—stampings—to the design and construction of important ship components with outstanding production speed, cost, and engineering advantages.

24-51. Outstanding Designs. Machine Design, v. 16, Oct. '44, pp. 104-107.

Magnifying comparator; electronic oscilloscope; electronic power generator; automatic plastics molding press.

24-52. New Horizons in Product Design. Edward F. Flint. Die Casting, v. 2, Oct. '44, pp. 26-28, 64-67.

The design problem involved the combination of five elements which are separate instruments in themselves. These, besides having to perform satisfactorily individually, had to be combined into a compact lightweight instrument. Die casting permitted the consolidation of many separate parts into single castings.

24-53. Approximate Calculations for Helical Springs of Round Section. G. Ashworth. Machinery (London) v. 65, Sept. 14, '44, pp. 299-300.

Formulae which will give an immediate and close approximation to the final design when the ratio of the diameter of the spring rod to the diameter of the spring is within normal limits.

24-54. Factors in Machine Base Design. F. L. Lindemann. Industry and Welding, v. 17, Oct. '44, pp. 66, 68-69, 71-73.

Fabrication details of great importance.

## 25. MISCELLANEOUS

25-213. Automatic Riveting Realizes Manufacturing Economies. Paul Wise. Aviation, v. 43, Sept. '44, pp. 139-141, 263-264.

Forethought and the application of a few simple rules could multiply production rates, reduce fabrication costs, and improve quality of work. Notes on specific tooling methods.

25-214. Packaging for Postwar Export. Donald C. Macdonald. Iron Age, v. 154, Sept. 21, '44, pp. 52-58.

Conclusions arrived at about the methods of packaging which will be required for metal products, the place of packaging in establishing postwar markets, and descriptions are given of the materials and methods which will be retained in the postwar era.

25-215. Standards for the Acceptance or Rejection of Driven Rivets. Product Engineering, v. 15, Sept. '44, pp. 628-631.

Tests of improperly driven rivets and acceptability limits for such rivets. Recommended acceptability standards for all the common rivet malformations.

25-216. Selecting Hydraulic Seals. L. S. Linderoth. Machine Design, v. 16, Sept. '44, pp. 119-128.

Classification of packings; importance of surface finish; fastenings; effect of fluids and temperature; static seals; allowable pressures; extreme-pressure seals; dynamic seals; V-ring or chevron packings; U-cup packings; O-ring packings; piston seals; rotating shaft seals.

25-217. Vibration and Noise—Causes and Cures. II. Colin Carmichael. Machine Design, v. 16, Sept. '44, pp. 99-104.

Proper procedure in effecting a cure is first to eliminate or diminish as much as possible the source of the trouble, and then—if vibration still exists—to isolate the source through the use of suitable materials or mountings.

25-218. Centralized Lubrication Insures Bearing Life. I. John W. Greve. Machine Design, v. 16, Sept. '44, pp. 113-118.

Piston valves. Delivers definite quantity to each bearing; lubricates every bearing on forger.

25-219. Army Field Shops Repair and Rebuild Ordnance Equipment. William J. Hargest. American Machinist, v. 88, Sept. 14, '44, pp. 125-128.

United States Army Ordnance engineers have designed and built maintenance depots in the European theater of operations for complete overhaul of automotive engines, motor cars, artillery and combat vehicles. Engine shops are set up for line production and do an annual business of millions.

25-220. Bellows Sealing Device Protects Bearings from Abrasives. Roger W. Bolz. Product Engineering, v. 15, Sept. '44, pp. 614.

Spring-actuated brass bellows which maintain continuous seal contact. The bearing seal was designed for the miller to cope with infiltration of abrasives severe enough to cause rapid destruction of the lubrication system and bearings.

25-221. Modern Planning in an Aircrash Plant. P. B. T. Machinery (London), v. 65, July 27, '44, pp. 91-95.

Speeding up of manufacture and assembly.

25-222. Modern Planning in an Aircrash Plant. P. B. T. Machinery (London), v. 65, August 3, '44, pp. 123-125.

Outstanding features of the Curtis-Wright Plant.

25-223. Production Problems and Production Control. E. C. Brekelbaum. American Welding Society Preprint, Oct. '44.

Problems arising in production welding and production control; factors that differ from other production set-ups, as machining operations. Production Control System compared to methods of wage incentive and the advantages and disadvantages compared and discussed.

25-224. From Rifles Back to Typewriters. American Machinist, v. 88, Sept. 28, '44, pp. 121-123.

Careful planning combined with tapering off of war production enabled Smith-Corona to reconvert without any lost time and to use to advantage war-found knowledge and experiences.

25-225. Modern Light Metal Processing. W. B. Griffin. Light Metal Age, v. 2, Sept. '44, pp. 28-29.

Some of the versatile operations which a consumer deals with illustrated.

25-226. Safety in the Handling of Magnesium Alloys. Western Metals, v. 2, Sept. '44, pp. 60-63.

Principal hazards.

25-227. Maintaining War Production by Machine Tool Lubrication. Allen F. Brewer. Machinery, v. 51, Sept. '44, pp. 160-162.

Considerations in gear lubrication; lubrication of machine tool bearings; relation between load and oil viscosity; selection of lubricants; hydraulic oils.

25-228. What About the Gas Turbine. Edwin Laird Cadby. Scientific American, v. 171, Oct. '44, pp. 157-159.

Fundamental reasons why the gas turbine is emerging from the dream stage.

25-229. Dust in Steel Foundries. Engineering, v. 158, August 25, '44, p. 152.

Recommended practice for decreasing dust disablement.

25-230. Picture Drawings. Iron & Steel, v. 17, August '44, pp. 581-582.

Trimetric scale for "solid" projections.

25-231. The Structural Reinforcement of Liberty Ships. Welding Journal, v. 23, Sept. '44, pp. 789-794.

The details of the design, the characteristics of the materials, the methods of construction and restrictions on ballasting during operation.

25-232. Examination of Some Oil Coolers, Radiator Structures and Oil Tanks of Various Enemy Aircraft. Metallurgy, v. 30, August '44, pp. 202-210.

Summaries of data resulting from the metallurgical examination of parts from enemy aircraft carried out at the request of the Committee on Non-Ferrous Parts in Enemy Aircraft. The parts examined represent various oil coolers, radiator structures and oil tanks, and the main results are detailed.

25-233. Color Aids Improved System for Lubrication Control. C. I. Kraus. Steel, v. 115, Oct. 2, '44, pp. 72-73, 126, 128, 130.

Effective plan routes each lubricant from barrel to bearing; highlights hidden lubrication points so none is missed; helps prevent over or under lubrication; reduces number of different lubricants required by 30 to 75%.

25-234. Coffin Jacks. Steel, v. 115, Oct. 2, '44, p. 97.

Solve problem in fitting bronze liners and collars on steel shafts.

25-235. Some Aircraft-Engine Production Methods. Martin M. Holben. SAE Journal, v. 52, Oct. '44, pp. 492-500.

Time, space, machinery, and skilled labor are all being used much more economically and efficiently because of the development of many automatic and multi-operational machines.

25-236. A.I.S.E. Convention Warned Against Sacrificing Employment for Price. Iron Age, v. 154, Oct. 5, '44, pp. 68-73.

The Unitemper mill; gas turbines for blast furnace blowers; design and operation of modern sintering plants.

25-237. Integrated Handling. Ezra W. Clark. Steel, v. 115, Oct. 9, '44, pp. 134, 298, 300, 302.

Saves \$21.60 and 19 manhours per group of 36 valve units in shipping from supplier to assembly line; is excellent example of what can be done by improved palletizing for efficient handling of materials.

25-238. Special Metal Shapes. Steel, v. 115, Oct. 9, '44, p. 190.

Nearly half of all plants exhibit preference for special rolled and drawn sections to facilitate fabrication by welding and other means. Wartime simplification programs also may carry over into peacetime.

25-239. Chemicals Used in Steel Industry. J. L. Gregg. Chemical & Engineering News, v. 22, Sept. 25, '44, pp. 1558-1558, 1612.

Few appreciate the variety of chemicals employed in the manufacture of steels and the vast tonnage of many of these materials. Producers of these products will find this authoritative survey most illuminating in evaluating the market possibilities for chemicals in America's steel industry.

25-240. Machine Shop Practice and Foundry Technique. C. W. Marshall. Foundry Trade Journal, v. 74, Sept. 7, '44, pp. 11-12, 14.

Fostering cooperation to meet exacting post-war requirements.

25-241. Centralized Lubrication. C. I. Kraus. Steel, v. 115, Oct. 16, '44, pp. 96-97, 119-120.

Offers important economies by reducing manhours required to service machines, by cutting "down" time of machines, by affording better protection of enormous investments in plant equipment, by increasing production through fewer breakdowns. Power consumption also can be reduced, bearing life increased. Savings in lubricant and manpower pay for one installation every 93 days.

25-242. Sub-Zero Cooling Benefits Discussed by Experts. Tool Engineer, v. 14, Oct. '44, pp. 90-94.

Results of gage steel study; increasing tool life; super-cooling vs. tempering; more than transformation.

25-243. Needed Better Teamwork Between Designer and Metallurgist. Harry W. McQuaid. Machine Design, v. 16, Oct. '44, pp. 75-78.

The supervision of many special operations and the responsibility for the quality of the work has gravitated into the province of the supervisory metallurgist. The design engineer is equally interested in all these fields because they reflect in the performance of his designs. It is only by the wholehearted cooperation of the two types of engineers that either can be completely successful.

25-244. Centralized Lubrication Insures Bearing Life. John W. Greve. Machine Design, v. 16, Oct. '44, pp. 81-84.

Mechanical and restricted orifice lubricators.

25-245. Directory of Materials. Machine Design, v. 16, Oct. '44, pp. 174-246.

Iron, steel and non-ferrous metals listed by trade names. Index of alloys by principal constituents. New standard steel classifications. Producers of iron, steel and non-ferrous metals. Plastics and other non-metals listed by trade names. Index of plastics and non-metals by type. Producers of plastics and other non-metals. Stamping producers. Forgings producers. Machine die castings producers. Custom molders of plastics. Machine finishes producers.

25-246. Training in Metallurgical Chemistry. L. G. Whybrow Palethorpe. Chemical Age, v. 51, Sept. 2, '44, pp. 227-230.

Needs of the engineering industry.

25-247. Steel Plant Maintenance. A. G. Henry. Iron & Steel Engineer, v. 21, Sept. '44, pp. 43-45.

Maintenance problems in war-time differ from those of prewar days . . . post-war maintenance will benefit from some of the methods forced upon us by present necessity.

25-248. Pipe Cleaning. L. R. Robinson. Iron & Steel Engineer, v. 21, Sept. '44, pp. 46-50.

Method employed for cleaning pipe depends entirely upon the size of the pipe and the nature of the deposit.

25-249. Stocking and Handling Raw Material. J. T. Thomas. Iron & Steel Engineer, v. 21, Sept. '44, pp. 67-76.

An efficient and effective set-up for handling raw materials must consider the nature and use of the material to be stocked, the location and extent of area available, the track system, type of cars used, and the equipment available.

25-250. Longer Life for Industrial Diamonds. Purchasing, v. 17, Oct. '44, pp. 106-107.

Proper use and maintenance of common grade industrial diamonds is essential for good results and conservation.

25-251. Removing Broken Tools from Aluminum Alloy Parts. Metal Progress, v. 46, Oct. '44, p. 715.

An electrolytic process which dissolves out the broken tool in a remarkably short time without detrimental effects to the part.

25-252. The Dodge Chicago Forge Plant. P. D. Aird. Modern Industrial Press, v. 6, Oct. '44, pp. 15-17, 20.

The largest airplane engine plant in the world, occupying some 500 acres of ground peculiarly suited for the requirements of the plant, where from 19 major plant installations a steadily increasing flow of 18-cylinder, 2200-horsepower Wright air-cooled engines come each month.

25-253. Condensed Review of Some Recently Developed Materials. Machinery, v. 51, Oct. '44, pp. 171-178.

Class of material; trade name; properties; applications.

25-254. Recommended Methods for the Salvage Repair at the Factory of Damaged Parts on Airframes. Automotive Industries, v. 91, Oct. 1, '44, pp. 31-35, 98.

Cracked flange beaded lightening holes; damaged rivet holes.

25-255. Adhesives for Metals and Nonmetals. Kenneth Rose. Metals and Alloys, v. 20, Oct. '44, pp. 959-963.

Classifies and describes the most important of these and indicates their present and future uses, possibilities and limitations.

## 26. STATISTICS

**26-97. The Future of Western Steel.** Robert C. Elliott. *Western Metals*, v. 2, Oct. '44, pp. 9-14.  
Postwar visions of Henry J. Kaiser and Benjamin F. Fairless.

**26-98. Prospective Changes in the Mineral Industry of the West.** J. R. Mahoney. *Western Metals*, v. 2, Oct. '44, pp. 20-22.

Only a few of the new wartime mineral developments have had their full effects, and there remain many new adjustments that will continue the wartime expansion into new fields when the removal of restrictions permits the appropriate adjustments in the post-war period.

**26-99. Tin Conservation.** *Chemical Age*, v. 51, Sept. 2, '44, pp. 231-232.  
Economics in the U. S. canning industry. 7 ref.

**26-100. Post-War Domestic Copper Output Will Meet Home Requirements at Adequate Price Levels.** Walter R. Ingalls. *Metals*, v. 15, Sept. '44, pp. 6-9.

Balancing supply and demand will also depend on continuance of 4-cent tariff and "lock-up" of Government-owned stocks.

**26-101. Mercury Poses Difficult Post-War Problems for United States Government and Industry.** *Metals*, v. 15, Sept. '44, pp. 10-12.

Metals reserve stockpile equal to 3 years' peacetime needs. Home consumption expected to decline drastically. Spanish and Italian producers will seek to dominate world markets.

**26-102. Where Is Aluminum in Post-War Era?** Walter A. Jannsen. *Metals*, v. 15, Sept. '44, pp. 13-15.

Output in 1939 was 327,000,000 lb.; by end of 1943 domestic production capacity was 2,100,000,000 lb., 55% of which was vested in government-owned plants, balancing private.

**26-103. Trends in Alloy Steels.** A. B. Kinzel. *Metal Progress*, v. 46, Oct. '44, pp. 689-692.

An appraisal of post-war developments based on a close acquaintance with the recent history of alloy shortages, scrap supply, and new steels developed for special ordnance purposes.

**26-104. Metals in Peacetime Products.** *Steel*, v. 115, Oct. 9, '44, pp. 160-163.

Metalworking plants expect to expand use of steel, aluminum, copper and brass and magnesium. Sharp gain likewise is indicated for plastics.

**26-105. Outlook for Magnesium.** *Engineering & Mining Journal*, v. 145, Oct. '44, pp. 102-103.

Plentiful supply of the metal and wide experience in its use during the war portend broad application to postwar civilian purposes.

## 27. NEW BOOKS

**27-146. Meet the Electron.** David Grimes. 127 pp. illus., Pitman, New York. \$2.00.

A simplified statement of the theory of electronics, for the layman who wants to know just what makes his electrical appliances work.

**27-147. Sampling Inspection Tables; Single and Double Sampling.** Harold F. Dodge and Harry G. Romig. 112 pp. John Wiley and Sons, New York. \$1.50.

These tables were developed for use in the manufacture of communication apparatus and equipment for the Bell Telephone System.

**27-148. Ferrous Metallurgy, Volume III: Metallography and Heat Treatment of Iron and Steel.** Ernest J. Teichert. 2nd ed., 577 pp., illus., McGraw-Hill Book Co., New York. \$5.00.

Physical metallurgy of iron and steel alloys, metallography and heat treatment; up to date information on equipment and practice in the industry. An index has been included in the revision, and bibliographies have been added to most of the chapters.

**27-149. How to Operate a Lathe.** John T. Shuman and Lewis H. Bardo. 161 pp., illus., John Wiley and Sons, New York. \$1.75.

A simple practical text of the question and answer type. Numerous diagrams, illustrations and tables.

**27-150. Commercial Methods of Analysis.** Foster Dee Snell and Frank M. Biffen. 753 pp., illus., International Chemical Series, McGraw-Hill Book Co., New York. \$6.00.

The first four chapters describe the tools needed for analysis and their uses, and the general procedures of sampling, weighing, determination of refractive index and fractionation. The remainder of the volume deals with the actual methods of analyzing various products.

**27-151. Metals and Alloys Dictionary.** M. Merlub-Sobel. Chemical Publishing Co., Inc., Brooklyn, N. Y. \$4.50.

Contains over 10,000 useful metallurgical terms arranged in strict alphabetical order. Gives definitions of metallurgical terms, composition, properties and uses of all the important commercial alloys, physical constants and properties of chemical elements, description of machinery and processes used in modern metallurgy, and other pertinent information.

**27-152. Plastic Molding and Plant Management.** D. A. Dearle. Chemical Publishing Co., Inc., Brooklyn, N. Y. \$3.50.

Technique of compression and injection molding; solution to production and managerial problems; die design, costs, suitability of materials and methods, future trends of the industry.

**27-153. Pyrometry.** William P. Wood and James M. Cork. 2nd ed., 263 pp., illus., McGraw-Hill Book Co., New York. \$3.00.

Principles of temperature measurement; construction of pyrometers, thermometers, e.m.f. instruments, recorders, and controlling devices; operation and application of instruments. Corrections, calculations, working tables.

**27-154. Wartime Data Supplement to the American Machinist's Handbook.** Fred H. Colvin and Frank A. Stanley. 154 pp., illus., paper, McGraw-Hill Book Co., New York. \$1.00.

Facts and figures on new materials, tools, and methods used successfully in war production. Practical information on feeds, speeds, tool-settings, materials, methods, applicable to a variety of metal-working and machine shop problems.

## NEW PRODUCTS IN REVIEW

## NEW INOCULANTS FOR CAST IRON

Electro Metallurgical Co.,  
30 East 42nd St., New York 17, N. Y.

Two "stabilizing inoculants" for cast iron, which provide all the well-known benefits of chromium in iron without the usual increase in depth of chill, have been developed by this company and are known as "CMSZ" alloys 4 and 5. These new ladle-addition alloys are handy means of adding both chromium and strong graphitizing agents.

Proper use of one of these alloys will result in noticeable improvement in the physical properties of a cast iron. Chief among the benefits derived are the increased hardness and wear resistance obtained from the addition of chromium, yet these effects are achieved with little or no loss in machinability. Even when the chromium content is as high as 2% the iron is machinable. The alloys also improve the tensile and transverse strength of a cast iron, they greatly reduce the tendency to growth, and they impart higher resistance to oxidation and to the annealing effect of elevated temperatures.

In most irons, worth-while improvement is obtained if enough alloy is introduced to add 0.35% chromium. However, the correct grade and amount of alloy to use will depend principally on the composition of the base iron and the results desired. Further and more complete details are presented in booklet F-5907.

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## IRIDITE NOW AVAILABLE IN COLORS

Rheem Research Products Corp.,  
2523 Pennsylvania Ave., Baltimore 17, Md.

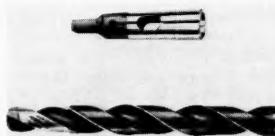
The developers of the Iridite process for rendering zinc and cadmium surfaces highly corrosion resistant have developed Iridite in several new colors. These new colors include maroon, blues, greens, bronze and blue-black. With the exception of bronze, all colors are applied by the dips—a first for the basic coating and a second dip in a dye-bath. Iridite bronze is a one-dip basic coating. Because the basic Iridite coating possesses excellent qualities as a paint base, the new Iridite colors can be clear lacquered for even greater durability.

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## NEW "SHANKLESS" HIGH SPEED ROLL-FORGED TWIST DRILL

Republic Drill & Tool Co.,  
322 South Green Street, Chicago 7, Ill.

An interesting development introduced at the recent Metal Show in Cleveland was the shankless high speed drill, invented by Raymond R. Rausch who is presently the general superintendent of the Ford Motor Co. Republic Drill describes the tool as a high speed drill with a continuous flute produced by roll-forging and hot-twisting and



driven by a removable taper shank known as a "drill driver". The drill driver, however, is not a new tool. In fact, drill drivers have been widely used for over 25 years for driving the smaller sizes of conventional straight shank drills. Illustrated is the new shankless drill and the drill driver.

Among the advantages claimed for the new shankless drill are the following: Because of the lower manufacturing costs of shankless drills, the selling prices of these new drills are 20 to 30% below those of Republic's conventional high speed taper shank drills. The usable portion of the flutes of shankless drills is 25 to 40% greater than Republic's conventional high speed taper shank drills. The shankless drill is tougher and stronger because it is roll-forged and because it has a heavier web than Republic's conventional drill. The neck or driver end of the shankless drill is toughened by proper heat treatment, so that it will "give" slightly under severe torsional strain. This shock absorber action accounts for greatly reduced drill breakage on the more difficult drilling jobs. The new drill is made in 135 sizes, from  $\frac{1}{4}$  to 2 in. diameter. Only seven sizes of drill drivers are required for driving these 135 drill sizes. Complete descriptive literature is available by addressing a request to the company or by using the Reader Service Coupon on page 23.

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## ALUMINUM TOGGLE CLAMP

Detroit Stamping Co., 378 Midland Ave., Detroit 3, Mich.

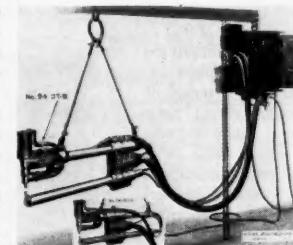
This new light-duty, all-aluminum toggle action clamp was especially developed for use on portable or spot welding fixtures but should prove equally interesting wherever space limitations or weight of clamp is a factor. Known as model 202-A, this toggle clamp is made of pressed aluminum parts. It weighs less than 3 oz., including steel hold-down-spindle and adjustment nuts. It measures  $2\frac{1}{2}$  in. long,  $1\frac{1}{8}$  in. wide at base, and  $3\frac{1}{8}$  in. high when in locked position.

Mention R614 When Writing or Using Reader Service.

## PORTABLE AIR OPERATED ADJUSTABLE GUN WELDER

Eisler Engineering Co., Inc., Newark, N. J.

Emphasizing the economical usefulness of extending the field of service of portable resistance welding equipment, considerable work has been accomplished by this company in improving and simplifying the adaptability of portable welders to a wide variety of post-war uses.



Where the volume of production does not justify the purchase of large welding equipment, on places hard to reach with a stationary welding machine, when it is not practical to move the bulky work to the regular production line, this type of easily transportable, easy to handle, free swinging welding unit will have a definite place in the production set-up, saving time and material, and reducing drastically the production costs without sacrificing the normal quality of the work. The portable gun welder illustrated is a direct air-operated welding machine, equipped with a double acting air cylinder and the necessary operating mechanism, fully or semi-automatic, depending on the choice of control. The power part consists of an air-cooled transformer, with an 8-tap switch for heat regulation (7 on and 1 off position), a pneumatic or electronic actuated timer, and a high speed mechanical or electronic contactor for accurately timing the weld in speed or automatic repeat of strokes. The weld cycle can be initiated by a foot switch as illustrated, or push button.

The unit is self-contained. A distinctive feature of this model is the convenient adjustment to different throat depths in a range of 12 to 48 in.

Mention R615 When Writing or Using Reader Service.

## WATER SOLUBLE METAL CLEANER

Phillips Chemical Co., West Touhy Ave., Chicago 45, Ill.

A new addition to this company's line of controlled cleaning chemicals is a powerful emulsifying cleaner known as Swirt. It is said to act efficiently upon all types of grease, buffing compounds, cutting and machining coolants and oils, and is equally effective upon ferrous and non-ferrous metals.

An added feature is that it gives off no dangerous or disagreeable vapors to injure or annoy the operator and is in fact practically odorless. Being neither acid nor alkaline it will not etch nor pit and can safely be used on the most sensitive metals and alloys. Fire hazards are reduced because of its high flash point.

Swirt may be used in practically any sort of container and its operation is simple: Merely rinse in Swirt and flush with plain water.

Mention R616 When Writing or Using Reader Service.

## STRIPCOAT

The Dow Chemical Co., Midland, Mich.

By means of a mechanical dipping tank, this company demonstrated a wartime packaging development for metal parts during the National Metal Show in Cleveland. Stripcoat, a hot melt dip type of package, preserves, protects and packages metal parts in one operation. It is easily adaptable to production line procedure and manufacturers now using it report that it saves from 60 to 90% in packaging time as compared with conventional pre-war methods. This waterproof, abrasion resistant package is easily and quickly achieved by dipping metal parts in molten stripcoat. The coating forms a tough, skin-tight protective layer which conforms to the identical contours of the part, remaining tough and durable through a wide range of temperatures.

Variations of Stripcoat are now developed to meet future requirements for such applications as hardware items subjected to much customer handling where corrosion is a problem; packaging of inventory parts in automotive and aircraft replacement parts stations and for export shipment.

Mention R617 When Writing or Using Reader Service.

## HIGH SPEED STEEL ELECTRODE

American Manganese Steel Div.,  
American Brake Shoe Co., Chicago, Heights, Ill.

This new welding rod known as Tool-Face is a high carbon, high chromium, molybdenum, tungsten and vanadium bearing rod. Its present uses are to manufacture composite cutting tools for lathes, shapers, etc. It is also used in manufacturing composite forging dies, rock drill bits and for salvaging high speed tool steel parts. It has a guaranteed Brinell hardness of between 575 and 675. It can also be used as a general hard surfacing rod where extreme hardness and resistance to shock are of primary importance. Available in standard lengths and for gas or arc welding.

Mention R618 When Writing or Using Reader Service.

# NEW PRODUCTS IN REVIEW

## MULTI-RECTIFIER

Green Electric Laboratories,  
130 Cedar St., New York 6, N. Y.

Research and development laboratories which have heretofore faced diverse and difficult problems with regard to d.c. power supplies have a distinct asset in the newly developed Multi-Rectifier. This single unit, a complete departure in terms of flexibility, allows for a range of from 0 to 48 volts in a compact mechanism. This new Multi-Rectifier incorporates six selenium rectifier sections which may be interconnected by external links to provide four ranges of d.c. power.

Other features include a three-phase magnetic contactor in the main power supply circuit with on-off push buttons, pilot lamp, Monitor lamp, buzzer and Automatic Watchman which provides automatic current interruption in case of prolonged overload. The Multi-Rectifier is available for operation from 220 to 440 volts or as specified at 60 cycles.

**Mention R619 When Writing or Using Reader Service.**



## VITRIFIED BONDED DIAMOND WHEEL

Norton Company, Worcester, Mass.

The development of vitrified bonded diamond wheel is announced by this company. This new wheel supplements the resinoid bonded diamond wheel introduced by Norton in 1934 and the metal bonded diamond wheel introduced in 1939.

Outstanding feature of the vitrified bonded diamond wheel, and also a vitrified bonded diamond hand hone, is the combination of a fast cutting action with extremely long life. In one plant, for example, a Norton vitrified bonded chip breaker wheel ground 2404 tools with  $\frac{1}{8}$  in. wear compared to 1350 tools with  $\frac{1}{4}$  in. wear for a resinoid bonded diamond wheel. Another important advantage is the ability of the Norton vitrified bonded diamond wheel to grind shank steel with little tendency to glaze or load. This characteristic is especially valuable where a relatively large area of steel must be ground with the carbide tip as is necessary in the case of cutter blades.

Norton vitrified bonded diamond hand hones and 4-in. and 6-in. diameter chip breaker wheels are available now. Large scale production of the popular  $6 \times \frac{3}{8}$ -in. cup and other sizes of Norton vitrified bonded diamond wheels will start early in 1945.

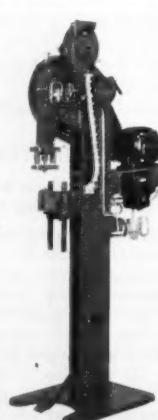
**Mention R620 When Writing or Using Reader Service.**

## RIVETING PAIL EARS

Tomkins-Johnson Co., Jackson, Mich.

Three operations are performed at one stroke of the ram with this electrically powered "Rivitor", especially adapted to the job of piercing, dimpling and riveting bail ears on pails, using  $1\frac{1}{4}$ -lb. tinner's rivets.

Rivets are underfed by the machine, as on a standard underfeed "Rivitor". The unpierced pail and ear are placed over the rivet and properly located by gages. When the ram descends, a combination piercing and dimpling die mounted on a spring-actuated pressure pad attached to the ram forces the work over the rivet, piercing and forming a dimple in the pail and ear. The dimple is deep enough to prevent the manufactured head of the rivet from projecting inside the pail. At the end of the down stroke, the rivet set (not visible in the photograph because of the pressure pad) forms a slightly rounded head on the rivet.



**Mention R621 When Writing or Using Reader Service.**

## ELECTRODE HOLDER

The Lincoln Electric Co., Cleveland, Ohio

A new holder for welding electrodes, said to be lighter (22 oz.) and lower in cost than other insulated holders of equivalent capacity, is announced by this company. Having a current rating of 300 amperes with ample capacity for overload, the new holder will handle various sizes of electrodes ranging from  $\frac{1}{16}$  in. diameter to  $\frac{1}{4}$  in. diameter inclusive.

Jaws made of high conducting and wear resisting copper alloy known as Lincalloy will withstand rough treatment and are fully guarded from contacting the work by a durable spring steel insulating guard that is easily replaceable. The trigger of the holder is of molded, heat resisting inorganic material.

Other features of this new holder include hollow, air-cooled, heat resisting fibre handle, excellent balance and equally good performance on both a.c. and d.c. current. The holder is designed to hold the electrode securely at any angle yet permit quick and easy change of rods.

**Mention R622 When Writing or Using Reader Service.**



## UNITEMPER MILL

United Engineering & Foundry Co.,  
First National Bank Bldg., Pittsburgh, Pa.

This company has announced its first major development for the postwar steel making era—a rolling mill unit of radical design for strip produced to the higher qualities demanded in recent years.

The new mill was designed in answer to the perennial request of can manufacturers for a tin plate of greater temper hardness combined with satisfactory ductility and flatness for fabrication. Called the "Unitemper Mill," it works on the principle of continuous stretching. The Unitemper mill will be utilized not only for tin plate, but also for tempering auto body sheets, furniture sheets, stainless steel panels and other strip mill items.

Previously, to meet some of the demands of can manufacturers, "Temper Pass" mills were built heavier and stronger to withstand rolling loads sometimes higher than those encountered in rolling for reduction in gage in cold strip mills. United Engineering research, as a result, was aimed at development of a temper mill of lesser cost and more economical operation which would produce extreme hardness combined with exceptionally high ductility in the product.

The mill, which was tested and perfected in cooperation with the Republic Steel Corp., at Niles, Ohio, and has recently been placed in full production there, is similar in appearance to a conventional four-high mill but operates on an entirely different principle. The strip is continuously processed by a stretching operation to the extent necessary to obtain the desired temper, hardness and ductility.

**Mention R623 When Writing or Using Reader Service.**



## MEEHANITE CUTTING BODIES

The Cooper-Bessemer Corp.,  
Mt. Vernon, Ohio, and Grove City, Pa.

Great interest has been shown in the use of Meehanite cast metal as the base for carbide tipped cutting tools. Illustrated are miller cutting bodies of cast Meehanite metal, typical of the types and sizes being produced by this company.

Cooper-Bessemer obtained the successful use of Meehanite first as a substitute for steel for tool shanks. Thereafter it was quite natural that thought was directed toward applying Meehanite to other cutting tools such as forming tools and milling cutter bodies. The reception given these tools by users is even greater than that given single purpose tool shanks. High speed milling has become an established fact. At the present time the speed at which metal can be removed by this process is limited only by the capacity of the existing milling machine design. Much will be done in the very near future to improve milling machines so that higher cutting speeds and power will be available to make this an even more outstanding method of removing metal. The economy of Meehanite bodies, carbide tipped, will play an important part in this development.

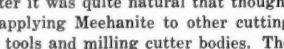
**Mention R624 When Writing or Using Reader Service.**

## NEW $\frac{1}{4}$ -IN. CAPACITY IMPACT WRENCH

Aro Equipment Corp., Bryan, Ohio

A new  $\frac{1}{4}$ -in. impact wrench, operating with controlled torque, is designed to eliminate stretching or "burning" of threads in setting nuts, bolts or Phillips screws. It is capable of both forward and reverse rotation and has a calibrated adjusting screw on the side of the motor that enables the operator to set any bolt, nut or screw to any desired tension.

**Mention R625 When Writing or Using Reader Service.**



## VOLTAGE REGULATOR

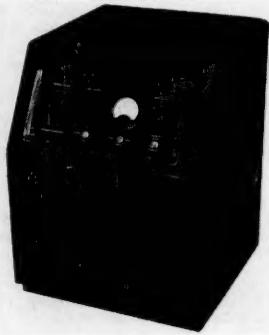
Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4, Mich.

A new large electronic voltage regulator for supplying constant voltage a.c. power to units requiring extremely stable voltage input is announced by this company. This unit is suited for converting the fluctuating voltage obtained from commercial 115-volt, 60-cycle, a.c. circuits to a highly stabilized voltage to operate precision photo-electric densitometers and other equipment.

Output power is 160 watts at 110 volts, a.c. The output voltage may be adjusted from 100 to 120 volts. The electrical regulation factor is about 1000, thus reducing a 10-volt input fluctuation to a few tenths of a volt. A frequency change in the input voltage will not vary the output voltage. Complete stability is obtained in seven minutes after starting the unit.

This regulator is 26 in. high, 19 in. wide and 22 in. deep. It weighs 100 lb.

**Mention R626 When Writing or Using Reader Service.**



## X-RAY SPECTROMETER

North American Philips Co., Inc.,  
100 East 42nd St., New York 17, N. Y.

Another new development shown at the recent Metal Show was the Geiger counter X-ray spectrometer, the latest addition to the Norelco line of industrial X-ray equipment. This spectrometer is said to provide an extremely accurate method for measuring distribution and intensities of X-ray reflections. For certain applications, it has some advantage over conventional diffraction procedure which entails exposure and development of film besides measurements and computations. The spectrometer provides a rapid method for directly determining location and intensity of diffracted rays.

A scanning device, having a Geiger counter tube arranged to traverse a graduated quadrant, is used in combination with suitable scaling circuits. The intensity measurements are quantitatively accurate and can therefore be used to determine composition of crystalline mixtures. Quantitative analyses of mixtures can be obtained in a matter of minutes.

In actual operation, the specimen inserted in the specimen holder intercepts the X-ray beam and deflects portions of it at various fixed angles. When the Geiger counter tube is moved around its quadrant, it measures angular displacement and intensity of the deflected beams. A d.c. micro-ampere meter reads intensity; the quadrant, marked in degrees, shows diffraction angles. A stepping counter, employed in conjunction with a specially developed scaling circuit, provides a means for exacting quantitative determination of intensity.

The Norelco spectrometer is designed for accurate, rapid analysis, and is adaptable for use in routine process control.

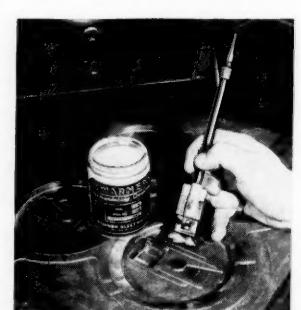
**Mention R627 When Writing or Using Reader Service.**

## PORTABLE ELECTROPLATER

Warner Electric Company, Inc.,  
360 N. Michigan Ave., Chicago 1, Ill.

A new, improved electrolytic brush, used in conjunction with the Warner electroplating compounds, has now become available for peacetime production. The new brush and process are now being employed in an increasing number of industrial applications. This method has proved practical and demonstrated its usefulness in decorative work, maintenance, and in the salvaging of tank-plated rejects. Immovable objects may be electroplated without being dismantled. A company's name or trade mark may be electroplated on the article being manufactured. The conductivity of electric switch contacts, blades and jacks may be improved or renewed without disassembly. Dies and shafts may also be plated and renewed when worn.

Compounds are available in gold, silver, nickel, copper, cadmium and chromium. A folder describing industrial applications of "Electroplating by Brush" is available.



**Mention R628 When Writing or Using Reader Service.**

# NEW PRODUCTS IN REVIEW

## OIL-HYDRAULIC BENCH PRESS

Denison Engineering Co., Columbus, Ohio

To those seeking a new and economical means of speeding operations requiring anywhere from 300 to 8000-lb. pressures in single, or repeated up and down strokes, this new bench machine will be of interest. Called Multipress because it is basically an oil-hydraulic press of many uses, it will deliver up to 4 tons downstroke pressure and up to 5000 lb. "pull up" pressure even though completely self contained in a streamlined housing measuring only 16 x 26 x 34 in. and weighing only 745 lb.

It has been especially designed to utilize a wide variety of accessories and fixtures with which it can perform innumerable production operations, such as pelleting, honing, broaching, peening, assembling, burnishing and straightening. In fact, the manufacturer suggests 25 or 30 already known applications and claims that other uses are being learned of daily.

Depressing the control levers causes the ram to move downward. Releasing either lever stops the ram instantly. Releasing the other lever causes the ram to return to its upper limit, where it is positively held. By slowly depressing the hand levers, the ram can be "inched" downward slowly and positioned exactly above the work before pressure is applied. Full pressure can be applied upon the work at once by completely depressing the levers at once, or can be increased gradually by merely depressing the levers slowly. The eye-level gage indicates pressures.

Mention R629 When Writing or Using Reader Service.

## ARMATURE STRAIGHTENING PRESS

Anderson Bros. Mfg. Co., Rockford, Ill.

A high-speed armature straightening press is announced with three or more indicators employed to check the straightness of the shaft at vital points. These indicators are attached to one pivot shaft and are all swung into position and out of position with one movement of the hand.

The spring-mounted centers are mounted on a "V" slide which prevents tipping and accidents for especially heavy armatures. The ram is of the traveling type and rolls along on four pre-lubricated ball bearings. The hydraulic gage is mounted directly on the ram and is in line with the operator's eye for quick reading. It will swing armatures up to 14 in. diameter. Capacity of the press is 20 tons. Total length is 65 in.

Mention R630 When Writing or Using Reader Service.

## TEMPERATURE CONTROL SYSTEM

Leeds & Northrup Co.,  
4934 Stenton Ave., Philadelphia 44, Pa.

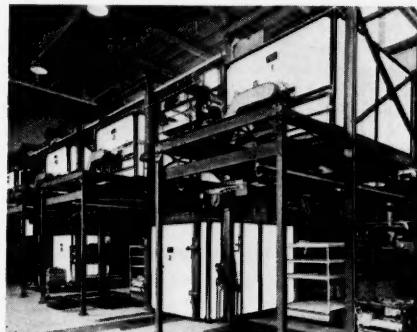
To bring to electrically heated furnaces, ovens and similar units a dependable regulation of temperature, a new type of Micromax electric control has just been announced. This Duration-Adjusting type not only regulates electric input to hold temperature at a selected control point or to a program, but is said to hold it there so dependably that users obtain the most efficient balance of product uniformity, speed of output, and flexibility of operation.

By means of an on-off contacting system, it feeds to the heating unit the electric current needed to keep temperature to the required control point or program. Input is either full-on or full-off. Regulation is obtained by controlling automatically the time during which current is on and off. This system provides full proportional time action, as compared with the more familiar full proportional position action. It provides automatic droop-correction. It can be equipped with "overshoot control," valuable when the furnace or other unit is coming up to temperature.

Mention R631 When Writing or Using Reader Service.

## HEAT TREATING AND QUENCH OVENS

Gehring Oven Div., W. S. Rockwell Co., New York, N. Y.



An important advance in oven engineering is an installation of a battery of ovens for automatic handling and heat treating aluminum castings used in marine, aircraft and artillery control and kindred precision equipment parts. It combines the advantages of time and labor saving through automatic handling with the need for batch heating and cooling required in the plant.

Installation consists of four elevator type ovens supported on heavy structural steel framework extending to the building floor, leaving ample clearance underneath each oven to permit easy loading and unloading. Directly underneath the loading station of each oven is a quench tank. Thus, with the oven mounted above and the quench tank below the floor level, the space between them is used for setting the rack or cage of work ready for raising into the oven while the cage of heated work is being cooled in the tank beneath.

The oven is electrically heated with forced air recirculation. The cage carries a work load of 800 lb.

Mention R632 When Writing or Using Reader Service.

## PRODUCTION MACHINES FOR SHOT PEENING

American Foundry Equipment Co.,  
555 S. Brykit St., Mishawaka, Ind.

To increase the life of stressed parts by shot peening, a line of machines known as Wheelpoening equipment has been announced by this company. In these machines, a rain of metallic shot is directed against the part at high velocity. Each shot striking the surface makes a tiny dent or pit, so that the cumulative effect is to stretch the surface layers by cold working, to put them in a state of residual compression. And since failure occurs

under tension stresses, never under compression stresses, fatigue cracks do not get a chance to start.

With this Wheelpoening machine, torsion bars are placed on skewed-dished rollers which convey the bars through the machine and impart a rotary motion so that all surfaces of the bar are exposed to peening action. Inside the machine, a Wheelabator hurls a rain of shot at high velocity onto the surfaces of the torsion bar. Other models of Wheelpoening machines are available to give different combinations of motion for peening parts of various shapes and sizes.

Provision is made in Wheelpoening equipment for the continuous re-use of shot, for the removal of broken shot and dust, and for the addition of new shot.

Mention R633 When Writing or Using Reader Service.

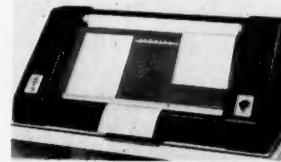
## DOUBLE REPRODUCTION WITH COPYFLEX PRINTER

Charles Bruning Co., Inc., Chicago, Ill.

New reproduction advantages, as well as double utility, are offered in the new BW-Copyflex Model 2 continuous printer, which will duplicate anything drawn, typed, printed or illustrated.

This machine exposes, with the use of Copyflex materials, tracings, line drawings, specifications, Van Dyke negatives and blue prints. Original material with copy on both sides can be reproduced on either side or both sides. Prints are developed in trays and dried in a simple drier. With the flick of a switch, the Model 2 becomes a BW printer for exposing black and white prints.

Mention R634 When Writing or Using Reader Service.



## ARMCO COLD ROLLED PAINTGRIP

The American Rolling Mill Co., Middletown, Ohio.

Armco Cold Rolled Paintgrip is described by the company as essentially a steel sheet that is given an electrolytic zinc flash and then Bonderized at the mill. Advantages of the sheet are listed: (1) Products can be drawn or formed and painted immediately. Bonderizing after fabrication is eliminated and no surface etching is needed. (2) Cold Rolled Paintgrip will draw, form, weld and solder readily. The Bonderized surface will not flake, peel or powder during fabrication. (3) Under normal conditions it resists rust during shipment and while in storage, either as sheets or in semi-finished parts.

Mention R635 When Writing or Using Reader Service.

## READER SERVICE COUPON

### CHECK THESE NUMBERS FOR PRODUCTION INFORMATION AND MANUFACTURERS' CATALOGS

Use this convenient method to obtain further information on items of interest to you in THE METALS REVIEW. The following numbers refer to the new products, manufacturers' literature and advertisements in this issue.

Check as you read—note the number immediately below the item of interest—mark this coupon and mail for prompt handling.

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R596	R603	R610	R617	R624	R631	R638	R645
R597	R604	R611	R618	R625	R632	R639	R646
R598	R605	R612	R619	R626	R633	R640	R647
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November, 1944

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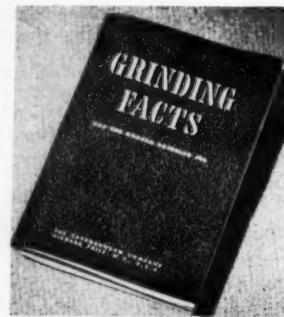
# MANUFACTURERS' CATALOGS IN REVIEW

## Grinding Facts

Carborundum Co., Niagara Falls, N. Y.

To acquaint grinding wheel users with the newly announced standard markings for identifying grinding wheels and other bonded abrasives, this company has prepared "Grinding Facts," a 136-page reference book on grinding. It includes a complete explanation of the new marking symbols; a comprehensive schedule of grading recommendations for general, toolroom, diamond wheel, and thread grinding; a description of each common type of grinding; safety rules; and a table of useful speeds. For a free copy write on your business or company letterhead to the Carborundum Co., mentioning The Metals Review number shown below.

Mention R636 When Writing or Using Reader Service.



## Facts for Foundrymen

Niagara Falls Smelting & Refining Corp.,  
2204 Elmwood Ave., Buffalo 17, N. Y.

"Facts for Foundrymen" is an 80-page, cloth bound book dedicated to foundrymen and their many problems, written by Ernest G. Jarvis and Herbert O. Jarvis of this company. In its fifth successful edition, this book is comprehensively indexed for convenient reference. The ever-increasing demand for information regarding the modern application of metals and their alloys for specific purposes has prompted the authors to revise and bring up to date the facts shown in this book. It is intended as a foundrymen's handbook and it is available free of charge to all foundrymen writing to the company on their letterhead.

Mention R637 When Writing or Using Reader Service.

## Thermocouple Data Book

Wheelco Instruments Co.,  
Harrison and Peoria Sts., Chicago 7, Ill.

A new enlarged edition of its Thermocouple Data Book and Catalog has been issued by this company. Designated Bulletin S2-5 and containing 40 pages, the catalog describes products, gives prices, and offers recommendations for thermocouple users. It gives helpful data in selection of thermocouples, lead wire, protecting tubes, heads and insulators. Also included are millivolt tables on various types of thermocouples, temperature conversion tables, tables on wire resistance and on pipe and wire sizes, and a fraction-decimal equivalent chart.

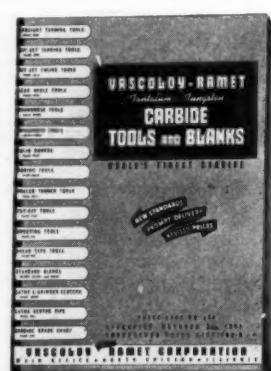
Mention R638 When Writing or Using Reader Service.

## Carbide Tools and Blanks

Vascoloy-Ramet Corp., North Chicago, Ill.

This illustrated 10-page booklet presents the new "Tantalum-Tungsten Carbide Tool and Blank Price List No. VR 330". This list contains a number of new standard tools, and additional sizes in both tools and blanks have been added. A convenient index on the front cover of the booklet shows where information can be found on 16 different types of tools.

Mention R639 When Writing or Using Reader Service.



## Typical Heat Treating Tongs

Lindberg Engineering Co.,  
2460 West Hubbard St., Chicago, Ill.

"Heat Treating Hints," the interesting monthly publication of this company, presented a special insert in its current issue devoted to the design and dimension of the basic heat treating tongs. Prepared as an answer to many inquiries received by Lindberg both for type, dimension, material used, and quantity required, the dimensions apply for every size tong. For heavier or lighter work requiring heavier or lighter tongs, the dimensions may be proportionally scaled. It is said that the tongs described will handle over 90% of all heat treating work. Copies of this material may be obtained from Lindberg.

Mention R640 When Writing or Using Reader Service.

## High Pressure Autoclaves

Struthers Wells Corp.,  
Special Equipment Division, Titusville, Pa.

An attractive and informative eight-page bulletin describes this company's complete line of standard and specially designed high pressure autoclaves. The bulletin gives complete description as well as factual data on each unit, and is fully illustrated. These autoclaves are fabricated from forged steel or any non-corrosive commercial alloys, and withstand pressures up to 25,000 psi.

Mention R641 When Writing or Using Reader Service.

## Cold Finished Bar Steels

Bliss & Laughlin, Inc., Harvey, Ill., and Buffalo, N. Y.

This well-illustrated 32-page booklet on cold finished bar steel tells what it is, how it is made, and where it is used. The company points out that for more than a half-century it has been producing cold finished bar steels, and that cold finished bar steel is a prime construction material for all types of mechanical equipment, processing machinery, scientific instruments, farm implements, household appliances, electrical apparatus, automotive parts and a myriad of other items.

Mention R642 When Writing or Using Reader Service.

## Tool Steel Welding Catalog

Welding Equipment & Supply Co.,  
223 Leib St., Detroit 7, Mich.

This 40-page tool steel welding manual and catalog presents technical information on metallic arc tool steel welding, which is the accumulation of eight years of extensive research, development and practical experience in the tool steel welding field.

This publication should be helpful to industry in reconversion since it outlines methods for saving time and material and avoiding production delay. Methods outlined include: How existing die units can be kept in operation with a minimum of "down-time". How changes can be made during die "try-out" periods by correcting design, rectifying error, etc. How contours, corners and edges of old dies can be welded during die "change-over" to adapt them to change of design. How die units can be compositionally fabricated by welding with desired tool steel electrodes on mild or medium carbon steel to form cutting edges or working areas. In addition exact procedures and welding sequences are outlined.

Mention R643 When Writing or Using Reader Service.

## New Cutting Tool Catalog

Robert H. Clark Co.,  
9330 Santa Monica Blvd., Beverly Hills, Calif.

Printed in two colors and profusely illustrated with diagrams and photographs of actual operations, this 12-page catalog contains complete specifications and prices, as well as detailed descriptions of the entire line of Clark adjustable cutting tools. According to the company, the unique principle of adjustability applied to cutting tools is fully explained and the adaptability of these tools to reconversion programs is readily seen. An interesting feature of this new booklet is the handy index and ready reference which has been worked into the cover design. This and other short cuts have enabled the company to compile in 12 pages copy which would otherwise necessitate 16 pages.

Mention R644 When Writing or Using Reader Service.

## Steel Plate Calculator and Selector

Lukens Steel Co., Coatesville, Pa.

A combination Steel Plate Weight Calculator and Steel Plate Size Selector has been developed by this company for use by engineers and users of steel plate or equipment made of steel plate. The device is believed unique because of the wide range of gages, widths and lengths of steel plate, for which weights can be calculated. With the steel plate weight calculator, which operates somewhat like a slide rule, can be determined quickly the theoretical weight of any steel plate from 10 to 200 in. in width and from 3/16 to 6 in. in thickness. The steel plate size selector can determine the longest and widest steel plate obtainable for any desired thickness. Included with the selector is a table giving decimal equivalents and weights which will be of value to users of the device.

Mention R645 When Writing or Using Reader Service.

## Heat Treatment of Stainless Steels

Rustless Iron & Steel Corp.,  
3400 E. Chase St., Baltimore 13, Md.

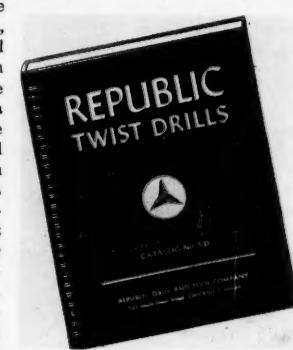
This helpful 56-page handbook on heat treatment of all the commonly used grades of stainless steel contains much information not previously published. Attractively illustrated and well indexed, this book discusses the three basic groups of stainless steel and heat treating techniques and results. Surface hardening, scale removal, pickling, and notes on heat treating problems and hardness testing are presented along with a glossary of terms. A series of heat treating data sheets are included in the envelope inside the back cover of this very helpful book.

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## Republic Twist Drills

Republic Drill & Tool Co.,  
322 South Green St., Chicago 7, Ill.

This comprehensive catalog describes and pictures the high speed and carbon steel twist drills manufactured by this company. Completely indexed and presenting much technical data, the catalog covers high speed drills, shankless and all-flute high speed drills, carbon drills and special purpose high speed drills. The book also includes a picture tour of the Republic plant and the technical section contains data, tables and engineering information pertinent to the use of cutting tools and to the machining of metals. Included is information on twist drill terminology, correct drill pointing practice, drill points recommended for various materials, correct drilling speeds and feeds, general dimensions of shanks on taper shank tools, detailed dimensions of shanks and sockets, tap drill sizes and basic thread dimensions, decimal and metric equivalents of fractional inches, and decimal equivalents of regular sizes.



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## Refractories

Harbison-Walker Refractories Co.,  
Farmers Bank Building, Pittsburgh 22, Pa.

Very attractive eight-page leaflet describes the refractories which are being regularly produced at this company's Kentucky-Southern Ohio district plants from highest quality flint and plastic clays. The folder also contains information concerning insulating firebrick and high temperature bonding mortars which are produced in other plants not located in Kentucky or Ohio.

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## Selected Laboratory Equipment

Schaar & Co., 754 West Lexington St., Chicago 7, Ill.

This 319-page catalog is a handy, convenient reference book for the laboratory worker, featuring a complete listing of laboratory glassware and laboratory porcelain, a representative listing of the smaller pieces of apparatus used every day in the modern laboratory, and a careful selection of the larger pieces of equipment. This is part one of a new catalog No. 44 and is devoted to selective laboratory equipment. It is well indexed and covers a broad range of laboratory products and supplies.

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## Welding Assembly Positioning Equipment

Ransome Machinery Co., Dunellen, N. J.

This four-page bulletin presents in concise form the full line of Ransome welding and assembly positioning equipment, showing photographs, diagrams, specifications and important features of the positioners, as well as load rating tables.

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